The Holy Qur'an and the Sciences of Nature

A Theological Reflection

Mehdi Golshani

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and
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PREFACE

The five essays assembled here, as five chapters, are based on lectures delivered by the author on five different occasions. They are united in that they all concern the Holy Quran and the sciences of nature.

The first chapter deals with the Islamic conception of knowledge. There I have tried to show that Islam's recommen- dation for the acquisation of knowledge is not restricted to the paricular teachings of Shariah, but it applies to any kind of knowledge that is instrumental in bringing us closer to God. All sciences, whether theological or physical are means for obtaining proximity to God, and, as long as they play this role, they are sacred.

In the second chapter, I have tried to spell out the

reasons for the desirability of the physical and natural sciences in Islamic outlook. There, we find two fundamental reasons for the significance of these sciences in Islamic world-view:

1. The role of these sciences in knowing God.
2. The role of these sciences in the stability and glorification of the Muslim *`Ummah*.

In the third chapter, the Quranic urge for the integration of science and ethics is discussed.

In the fourth chapter, we are dealing with reasons for reference to natural phenomena in the Quran.

The fifth chapter deals with some basic problems of epistemology from the Quranic view-point. This is an area in which very little work is done, and here our concern is to stimulate Muslim scholars to spend more time and energy on this subject of fundamental importance.

I hope and pray that these essays may be a humble aid in stimulating further research in this area, in the revival of scientific spirit in the *`Ummah*, and in promoting scientific knowledge in the Muslim world.

Mehdi Golshani

CHAPTER 1

SCIENCE AND THE MUSLIM UMMAH

Islamic Conception of Knowledge

One of the distinctive features of Islam is its emphasis on knowledge. The Quran and the Islamic tradition *(sunnah)* invite Muslims to seek and acquire knowledge and wisdom and to hold men of knowledge in high esteem. Some of the Quranic verses and relevant traditions will be mentioned in the course of our discussion.

At the outset we may recall a famous *hadith* of the **Prophet Muhammad** SA (upon whom be Allah's peace and benedictions) that has come down through various sources; it says:

«طلب العلم فريضة على كل مسلم.»[1]

> *"Acquisition of knowledge is incumbent on every Muslim."*

This tradition brought up the discussion as to what kind of knowledge a Muslim should necessarily acquire ö an issue around which various opinions were offered in the past.

Abū Hāmid al-Ghazzālī (died A.D. 1111), in his famous book *'Ihyā' 'Ulūm al-Dīn* (The Revival of Religious Sciences), mentions that he had come across twenty different answers to the above question.[2] The theologians believed that the learning of Islamic theology *(kalām)* was an obligation, while the jurisprudents *(fuqahā)* thought that Islamic jurisprudence *(fiqh)* was implied in the prophetic tradition. al-Ghazzālī himself favoured the view that the knowledge whose acquistion is a religious obligation is limited to what one must know for correct performance of the acts obligatory for a muslim.[3] For instance, one whose occupation is animal husbandry should acquaint himself with the rules concerning *zakāt.* If one were a merchant doing business in an usurious environment, he ought to be aware of the religious injunction against usury *(riba)* so as to be able to effectively avoid it.

al-Ghazzālī then proceeds to discuss sciences whose knowledge is *wājib kifāī*[4] (something which is

obligatory for the whole society as long as the duty for fulfillment of a social need exists, but as soon as the duty is shouldered by enough number of individuals, others are automatically relieved of the obligation). Subsequently, he classifies all knowledge into ``religious" and ``non-religious" sciences. By ``religious sciences" he means the bulk of knowledge imparted through the prophetic teachings and the revelation. The rest constitute the ``non-religious" sciences. The non-religious sciences are further classified into ``praiseworthy" *(mahmūd)*, ``permissible" *(mubāh)* and ``undesirable" ones *(madhmūm)*. He puts history in the category of permissible sciences and magic and sorcery in the category of the undesirable fields of ``knowledge". The ``praiseworthy" sciences whose knowledge is necessary in the affairs of life are *wajib kifāʾ*; the rest of them bring additional merit to the learned who pursue them. He puts medicine, mathematics and crafts, whose sufficient knowledge is needed by the society, in the category of sciences which are *wajib kifāʾ*. Any further research into the detail[5] and and depth of problems of medical science or mathematics is put by al-Ghazzālī in the second category which involves merit for the scholar without

entailing any manner of obligation.

al-Ghazzālī classifies the religious sciences, too, into two groups: praiseworthy *(mahmūd)* and undesirable *(madhmūm)*. By ``undesirable religious sciences" he means those which are apparently oriented towards the *Shari'ah* but actually deviate from its teachings. He subdivides the ``praiseworthy religious sciences" into four groups:

1- **`Usūl** (principles; i.e. the Quran, the *sunnah*, *`ijmā`* or consensus and the traditions of the Prophet's companions)

2- **Furū`** (secondary or derived matters; e.g. problems of jurisprudence, ethics and mystical experience)

3- **Introductory studies** (Arabic grammar, syntax, etc.)

4- **Complementary studies** (recitation and interpretation of the Quran, study of the principles of jurisprudence, *`ilm al-rijal* or biographical research about narrators of the Islamic traditions, etc.)

al-Ghazzālī considers the knowledge of the disciplines contained in the above four groups to be *wājib kifāī*.

As to the extent to which one should learn the

``praiseworthy" sciences, al-Ghazzālī's view is that in matters of theology such as knowledge of God, Divine qualities, acts and commands, one should try to learn as much as is possible. However, as to religious topics whose knowledge is *wājib kifāī*, one should learn as much as is sufficient. Here the summary of his views is that one should not pursue learning of those sciences if there are already others devoting themselves to their study and if one were to do so, he should refrain from spending all his life for their learning, ``for knowledge is vast and life is short. They are preliminaries and not the end in themselves." [6]

As to theology *(kalām)*, his opinion is that only as much of it as is corroborated by the Quran and hadith is beneficial. Moreover, he says,``now that the heretics attempt to induce doubts (in the minds of unsophisticated believers), adequate knowledge of theology is necessary to confront them."

Regarding philosophy, **al-Ghazzālī** thinks that it can be categorized into four parts:[7]

1- Aritmethic and Geometry, which are legitimate and permissible.

2- Logic, which is a part of theology.

3- Divinities, which discusses Divine Essence and

Attributes and is also a part of theology.

4- Physics, which may be divided into two sections: one part which involves discussions opposed to the *Sharī'ah* and accordingly cannot even be considered a "science"; the other part discusses the qualities of bodies. The second part is similar to the science of medicine, although medicine is preferable to it. This section of physics is useless while medicine is useful.

Mullā **Muhsin Fayd Kāshānī**, in his book *al-Mahajjah al-Baydā'*[8], says:

> "*It is a personal obligation* (**wājib 'aynī**) *of every Muslim to learn Islamic jurisprudence to the extent of his needs. Further, learning of* **Fiqh** *to fulfil the need of others is* **wājib kifā'ī** *for him.*"

Regarding philosophy, **Kāshānī** says:[9]

> "*The components of philosophy are not the only ones distinguished by Abū Hāmid (al-Ghazzālī) ö upon whom be God's mercy. Philosophy covers many other fields of religious and mundane matters (for example astronomy, medicine and rhetoric etc.)... Whatever of these sciences that is about the Hereafter exists to the point of perfection in the Sharī'ah, and that which is not useful for the Hereafter is not*

> *needed; moreover, it may even hinder the pursuit of the path of Allah. In the case of those portions which are effective for the knowledge of the Divine but are not elaborated by the Shari`ah (like astronomy), it is sufficient to be satisfied with the simple unelaborated discussions of the Shari'ah about such matters."*[10]

In brief, in **Kāshānī's** opinion anyone who whishes to learn these sciences should first acquaint himself with the religious sciences.

Sadr al-Dīn Shīrāzī (Mullā Sadrā) in his commentary on *`Usūl al-Kāfī* regards al-Ghazzālī's limitation of obligatory knowledge for a Muslim to the matters of ritual practice and legitimate dealings as unacceptable.[11] In his opinion, learning of religious sciences (such as *tawhīd*, Divine attributes and acts) and human sciences (such as dispositions of the soul, its delights and afflictions) are also obligatory for the majority of human beings. Secondly, he believes that it is not at all essential that what is obligatory *(wājib `aynī)* for all to learn should apply identically in case of every individual and what is obligatory for one individual be regarded as being equally obligatory for

another.

Here, it seems appropriate to mention a few points discussed by **Sadr al-Dīn Shīrāzī** in his commentary on *`Usūl al-Kāfī* in relation to the tradition:

«طلب العلم فريضة على كل مسلم».

"Acquisition of knowledge is incumbent on every Muslim."

1- The word *`ilm* (knowlege or science), like the word "existence" *(wujūd)* has a broad range of meanings which vary from the viewpoints of strength or weakness, perfection or deficiency [12]. The word's generic sense covers this whole spectrum of meanings in which it has been used in the prophetic tradition. This broad sense of the word *`ilm* is common to all its varied meanings. Accordingly, the tradition intends to state that at whatever stage of knowlege one may be, he should strive to make further advance. The Prophet means that acquisition of knowledge is obligatory for all Muslims, scholars as well as ignorant men, beginners as well as learned scholars. Whatever stage of knowledge man may attain, he is still like a child entering into adulthood, i.e. he should learn things which were not obligatory for him earlier.

2- The tradition implies that a Muslim can never be relieved of his responsibility of acquiring knowledge. [13]

3- No field of knowledge or science is undesirable or detestable in itself; for knowledge is like light and so it is always desirable. The reason that some of the sciences have been regarded as ``undesirable'' is because of the undesirable effects they produce. [14]

Here we do not intend to enter into a discussion about sciences whose learning is obligatory *(wājib `aynī)* for every responsible *(mukallaf)* Muslim individual. Rather, we propose to discuss those sciences whose knowledge is a *wājib kifā'ī* for all the Muslim *`Ummah*. However, before we start to discuss the latter group, it seems useful to mention briefly our view about the former group (i.e. *wājib `aynī* group.) Our view in this matter is the same as that of Allāmah **Fayd Kāshānī**, as expressed in his book *Kitāb al-Wāfī*:

> *``The knowledge which is incumbent on every Muslim to acquire is the one that elevates man's position in the next world, and that which brings him the knowledge of his self, his Creator, prophets, messengers of God, elite of Islam, signs of God, doomsday, and whatever causes proximity of God or divergence from the*

Almighty's way. The levels of acquisition of this knowledge differ from person to person in accordance with their talents, and even in the case of a particular person, the level of attainment changes with his evolution. Therefore, there is no limit to the acquisition of this type of knowledge, and no matter what level one reaches, it is still incumbent on him to attain a higher level (this of course depends on his capacity and patience too)." [15]

In the case of the sciences which belong to the category of *wājib-kifāī*, we find some of the views of al-Ghazzālī and Allamah Kāshānī disputable:

1- we do not approve of their classification of sciences into "religious" and "non-religious". As the Martyr Professor **Murtadā Mutahharī** has rightly pointed out, such classifications may entail the mis-conception that the "non-religious" sciences are alien to Islam ö the religion which claims to bestow full felicity upon mankind. A religion that considers itself self- sufficing cannot estrange itself from the issues which play a vital role in securing welfare and independence for the Islamic society. According to the late **Mutahharī:**

"Islam's comprehensiveness and finality as a religion demands that every field of knowledge that is beneficial for an Islamic society be regarded as a part and parcel of the "religious sciences".[16]

2- Besides, we think that the group of sciences belonging to the category of *wājib kifāʾī* is much larger than what al-Ghazzālī would have us believe. Moreover, we think that the parsimony he shows regarding those sciences which may be included in this category does not harmonize with the teachings of the Quran and the Islamic *sunnah.* Our reasons for not accepting such restrictions on learning are as follows:

1) In most of the Quranic verses and the Islamic traditions, the concept of *'ilm* (knowledge) appears in its absolutely general sense, as can be seen from examples given below:

«قل هل يستوى الّذين يعلمون والّـذين لا يـعلمون»
(الزمر/٩)

"Say: Are those who know and those who do not know alike?" (39:9)

«علّم الانسان مالم يعلم» (علق/٥)

"(God) taught man what he knew not." (96:5)

«و علّم آدم الاسماء كلها ثم عـرضهم عـلى المـلائكة

فــقال انــبئونی بــاسماء هـؤلاء ان کـنتم صـادقین»
(بقره/۳۱)

"And He taught Adam all the names; then showed them to the angels, saying: 'Tell me the names of these, if you are right.' " (2:31)

«و فوق کل ذی علم علیم» (یوسف/۷۶)

"... and above everyone possessed of knowledge is the Allknowing one." (12:76)

«و منکم من یرد الی ارذل العمر لکی لا یعلم بعد عـلم
شیئاً» (نحل/۷۰)

"... and of you is he who is brought back to the worst part of life, so that after having knowledge he does not know anything..." (16:70)

The Prophet's tradition:

"Anyone who pursues a course in search of knowledge, God will ease his way to paradise".[17]

2) Some Quranic verses and the Prophet's traditions are explicit in pointing out that knowledge does not mean only learning the principles and laws of religion. As examples, we cite some of them here:

a) In the Quranic verse

«ولقد آتینا داود و سلیمان علماً و قالا الحمدالله الذی
فضلنا علی کثیر من عـباده المـؤمنین و ورث سـلیمان

داود و قال یا ایها الناس علمنا منطق‌الطیر و اوتینا من
کل شیء ان هذا لهوالفضل المبین» (نمل/۱۶ـ۱۵)

"And certainly We gave knowledge to Dawud (David) and Sulayman (Solomon), and they both said: 'Praise be to Allah, who has made us to excel many of His believing servants.' And Sulayman was Dawud's heir, and he said: 'o men! we have been taught the language of birds, and we have been given all things; most surely this is manifest grace'." (27:15-16)

Solomon (AS) considers knowing the language of birds as a Divine blessing or grace.

«الم‌تر ان اللّه انزل من السماء ماءً فاخرجنا بـه‌ثمرات
مختلفاً الوانها و من الجبال جدد بیض و حمر مختلف
الوانها و غرابیب سود و من الناس و الدواب و الانعام
مـختلف الوانـه کـذلك انـما یـخشی‌اللّـه مـن عـباده
العلماء...» (فاطر/۲۸ـ۲۷)

" Do you not see that God sends down water from the sky, then We bring forth with it fruits of various colours, and in the mountains are streaks, white and red and of various colours and others intensely black? And of men and beasts and cattle are of various colours likewise; only those of His servants endowed

with knowledge ('Ulamā) fear God; surely, God is Almighty and Forgiving." (35:27-28)

Clearly the word *'Ulamā* (possessors of knowledge) in the above verse refers to those who, being aware of the laws of nature and mysteries of creation, bow humbly to the grandeur and majesty of God.

«و ما علّمناه الشعر...» (يس/۶۹)

"And we have not taught him poetry." (36:69)

In the Quran, there is a reference to **Qāroun** as saying:

«قال انما اوتيته على علم عندى» (قصص/۷۸)

"He said: I have been given this only on account of the knowledge I have." (28:78)

b) Traditions of the following type:

«اطلبوا العلم ولو بالصين، فان طلب العلم فريضة على كل مسلم»

"Seek knowledge by even going to China, for seeking knowledge is incumbent on every Muslim."[18]

«اعلم الناس من جمع علم الناس الى علمه... و اكثرالناس قيمة اكثرهم علماً و اقل الناس قيمة اقلهم علماً»

"The most learned of men is the one who gathers knowledge from others on his own... the

> *most worthy of men is the most knowing and the meanest is the most ignorant."*[19]
>
> «الحكمة ضالّة المؤمن فحيث وجدها فهو احقّ بها»
>
> *``Wisdom is the believer's lost property; therefore, wherever he finds it, he deserves more than anyone else to have it."*[20]

The above-mentioned traditions have been reported from the **Prophet Muhammad** (SA) and narrations such as the following are reported from Imām **`Alī** (AS):

> «الحكمة ضالة المؤمن فاطلبوها ولو عندالمشرك، تكونوا احق بها واهلها»
>
> *``Wisdom is the lost property of believers, then seek it even if it be with polytheists, because you deserve to have it more tham they do."*[21]
>
> «خذالحكمة ممّن اتاك بها و انظر الى ما قال ولاتنظر الى من قال»
>
> *``Grasp wisdom from whoever offers it to you, see what is said not who says it."*[22]

All these sayings indicate that acquisition of knowledge is not confined to learning the principles and laws of religion, because it is quite obvious that China in those days was not the center of theological studies, but it was famous for its industry. Moreover, it

is clear that the laws and principles of Islam could not be learnt from atheists or polytheists.

3) Another reason for believing that `desirable' knowledge is not confined to theological studies or the *Sharī'ah* laws dealing with permissible and forbidden is the invaluable heritage itself left by Muslim scholars of the first few centuries after *Hijrah*. It is also confirmed by contemporary historians that Muslim scholars have been the torch bearers of science for many centuries, and their works were used as textbooks in Europe for several hundred years. In fact, a major reason why Muslim scholars assimilated the scienfitic heritage of other nations was that they did not see any conflict between the goals of science and religion, and were convinced that both religion and science aimed to demonstrate the unity of nature which in turn is an indication of the Unity of its Creator. It was for this very reason that theology and rational and physical sciences made up a conjoint discipline to be taught in theological schools and mosques.

4) To set aside a group of sciences on the pretext that they do not have as much value as the religious studies is not correct. Because, whatever field of knowledge is conducive to preservation of the strength

and vitality of an Islamic society, its knowlege is *wājib kifā'ī* in the same fashion as scholarship in religious sciences which has been mentioned in the holy Quran:

«و ما كان المؤمنون لينفروا كافة فلولا نفر من كل فرقه منهم طائفة ليتفقهوا في الدين و لينذروا قومهم اذا رجعوا اليهم لعلهم يحذرون» (توبه/١٢٢)

"It is not for the believers to go forth totally (to acquire scholarship in religion); but why should not a party of every section of them go forth, to become learned in religion, and to warn their people when they return to them so that they may beware?" (9:122)

Thus, we may conclude that the word *`ilm* as it occurs in the Quran and *Sunnah* appears in its generic sense rather than referring exclusively to religious studies. On this ground it can be said that Islam has only dissuaded Muslims from preoccupying themselves with any pursuit of such branches of knowledge whose harm is greater than their benefit (like magic and sorcery and games of chance used for gambling). The relevant sayings of the **Prophet Muhammad** (SA) may be noted:

«خير العلم ما نفع»

"The best fields of knowledge are those which

bring benefit."[23]

«اللهم انفعنی بما علّمتنی و علّمنی ما ینفعنی و زدنی علماً»

"O God! Benefit me through knowledge that You have bestowed on me, teach me whatever would benfit me, and increase my knowlege."[24]

Imām 'Alī (AS) is related as having said:

«لاخیر فی علم لاینفع»

"There is no good in knowledge which does not benefit."[25]

«و العلم اکثر من ان یحصی فخذ من کل شیء احسنه»

"Knowledge is too immense in scope for anyone to be able to learn all of it. So learn from each science its useful parts".[26]

There is no division of opinion on the necessity of acquiring knowledge relevant to religious studies. Accordingly, we shall abstain from any further discussion of the subject.[27] Instead, it is worthwhile to concentrate on the question of necessity of learning other sciences in the view of the Quran and *sunnah*. In this regard there are a number of arguments which we shall take up immediately.

1- If a field of knowledge is a prerequisite to the attainment of Islamic goal as envisaged by the

Shari'ah, its pursuit is an obligation *(wājib)*, since it entails the preliminary condition for fulfillment of a duty prescribed by the *Shari`ah.* For example, the physical welfare of individuals in an Islamic society is necessary, hence it is a *wājib kifa`ī* for the Muslims to study medicine.

Some are of the opinion that in this context the duty to learn any specific science depends on the need of the society for it. For example, in our day, in order to succeed in large scale agriculture or commerce, specialized knowledge of these subjects is necessary. Accordingley, it is a *wājib kifā`ī* for Muslims to specialize in these fields.

Evidently, if Muslims are to restrict their learnings to what has already been established in other countries, i.e. if they become satisfied with the minimum of their scientific requirements, then they will never be able to beat the non-Mushm world in scientific progress.

2- The society envisioned by the Quran is an independent society of majesty and grandeur, not one subservient to and dependent on the unbelievers, as can be seen from this verse of the Quran:

«... ولن يجعل الله للكافرين على المؤمنين سبيلاً»

(نساء/۱۴۱)

"...and Allah does not grant the unbelievers any way (of domination) over the believers." (4:141)

In order to realize this goal set by the Quran, it is essential that the Islamic society should have cultural, political and economic independence; this in turn necessitates training of specialists of high calibre in every field and the creation of the necessary scientific and technical facilities in Islamic societies. It is clear that one of the reasons for the decline of Muslim societies in the recent centuries is that they left the study of those sciences to others which they themselves deserved to study most, and made themselves dependent on others.

Should not the Muslims equip themselves in every way to defend themselves against the non-believers as stressed by the following verse?

«واعدّوا لهم مااستطعتم من قوة و من رباط الخيل ترهبون به‌عدوالله و عدوکم...» (انفال/۶۰)

"And prepare against them what force you can... so that you may dismay the enemy of God and your enemy and others beside them whom you know not; God knows them. Whatever you

spend in the way of God it will be repaid to you in full, and you will not be cheated." (8:60)

And is it not true that in our world today, possession of defence equipments to face the enemies of Islam requires all kinds of scientific and technical know-how? Then why do not the Muslims give the necessary attention to the issue of preparing themselves adequately for their self-defence?

In the modern age, human life is inextricably linked with the effort for scientific advancement and the key to success in all affairs lies in knowledge. It is, therefore, an obligation of Muslim scholars and researchers, living in the countries of either the Eastern or Western block and are engaged in education, to acquire the latest and most complete scientific and technical knowledge. Otherwise their societies will inevitably remain under the domination of one superpower or another. Imam **Ja'far al-Sādiq** (AS) says:

«العالم بزمانه لاتهجم عليه اللوابس»

"A man who is abreast of his time will not be overwhelmed by unexpected problems."[28]

To sum up, if the Muslims want to succeed in their struggle against the evil powers of this age, they should

equip themselves with the essentials of scientific advancement and endeavour to make up their lag in scientific and technical fields. Whatever subject is essential for safeguarding the existence and vitality of the Islamic societies should be learnt.

3- The Holy Quran invites mankind to study the system and scheme of creation, the wonders of nature and the causes and effects of all things that exist. the conditions of living organisms, and in short all signs of God discernable in the external universe and the inner depths of the human soul. The Quran enjoins thought and meditation on all aspects of creation and requires human beings to apply their reason and faculties to the discovery of the secrets of nature. We shall quote here a few verses:

«افلم ینظروا الی السماء فوقهم کیف بیناها و زیناها و ما لها من فروج و الارض مددناها و القینا فیها رواسی و انبتنا فیها من کل زوج بهیج تبصرة و ذکری لکل عبد منیب» (ق /۸-۶)

"What, have they not beheld heaven above them, how We have built it, and decked it out fair, and it has no cracks? And the earth ö We streched it forth, and cast on it firm mountains, and We caused to grow therein of every joyous

kind for an insight and a reminder to every penitent servant." (50:6-8)

«افلا ينظرون الى الابل كيف خلقت و الى السماء كيف رفعت و الى الجبال كيف نصبت و الى الارض كـيف سطحت» (غاشيه/ ۲۰ـ۱۷)

"What, do they not consider how the camel was created, how heaven was lifted up, how the mountains were hoisted, how the earth was outstretched?" (88: 18-21)

«قـل سـيروا فـى الارض فانظروا كيف بدء الخلق...» (عنكبوت/ ۲۰)

"Say: Journey in the land, then behold how He originated creation; then God causes the second growth; God is powerful over everything." (29:20)

«و فـىالارض آيـات للـموقنين و فـى انـفسكم افـلا تبصرون» (ذاريات/ ۲۲ـ۲۱)

"In the earth are signs for those having sure faith; and in yourselves; what, do you not see?" (51:20-21)

«ان فى خلق السموات و الارض و اخـتلاف اللـيل و النهار لآيات لاولى الالباب، الذين يذكرون اللّه قياماً و قعوداً و على جنوبهم و يتفكرون فى خلق السموات و الارض ربنا ما خلقت هذا باطلا سبحانك فـقنا عـذاب

النار» (آل‌عمران/ ۱۹۱ـ۱۹۰)

"Surely in the creation of the heavens and the earth and in the alternation of the night and day there are signs for men possessed of minds who remember God. Standing and sitting and on their side, and reflect upon the creation of the heavens and the earth: 'O Lord, Thou hast not created this out of falsehood. Glory be to Thee! Guard us against the chastisement of the Fire." (3:190-191)

«ان فی خلق السموات و الارض و اختلاف اللیل و النهار و الفلك التی تجری فی البحر بما ینفع الناس و ما انزل‌الله من السماء من ماء فاحیابه الارض بعد موتها و بث فیها من کل دابة و تصریف الریاح و السحاب المسخر بین السماء و الارض لآیات لقوم یعقلون» (بقره/ ۱۶۴)

"Surely in the creation of the heavens and the earth and the alternation of night and day and the ship that runs in the sea with profit to men, and the water God sends down from heaven therewith reviving the earth after it is dead and His scattering abroad in it all manner of crawling things, and the turning about of the winds and clouds compelled between heaven

and earth ö surely there are signs for a people having understanding." (2:164)

As can be seen from the foregoing verses, God refers to all existing things in the universe as the ``signs" of their Creator, and the system of the universe as the imprint of an omniscient designer and programmer. The study of the universe and what exists in it is considered to be one of the most important means for obtaining knowledge of God and recognizing the majesty of the Creator. Prophets also based their invitation to belief on this point. The Prophet Moses (AS) makes a similar argument in his confrontation with Pharaoh. The Quran quotes **Moses**(AS) as putting his argument in these words:

«قال ربنا الذی اعطی کلی شیء خلقه ثم هدی... الذی جعل لکم الارض مهداً و سلك فیها سبلاً و انـزل مـن السـماء مـاءً فـاخرجـنا بـه ازواجـاً مـن نـبات شـتی»
(طه/ ۵۳ـ۵۰)

``He said, `Our Lord is He who gave everything its creation. then guided it... He who appointed the earth to be a cradle for you, and therein threaded roads for you and sent down water out of heaven', and therewith We have brought forth diverse kinds of plants." (20:50-53)

Prophet **Noah** (AS) is quoted in the Quran as saying to his people:

«قال رب انی دعوت قومی لیلاً و نهاراً فلم یزدهم دعائی الا فراراً... فقلت استغفروا ربکم انه کان غفاراً... الم تروا کیف خلق الله سبع سموات طباقاً و جعل القمر فیهن نوراً و جعل الشمس سراجاً والله انبتکم من الارض نباتاً ثم یعیدکم فیها و یخرجکم اخراجاً والله جعل لکم الارض بساطاً لتسلکوا منها سبلاً فجاجاً»
(نوح / ۲۰-۵)

"He said, 'My Lord, I have called my people by night and by day, but my calling has only increased them in flight'... and I said, 'Ask you forgiveness of your Lord; surely He is ever All forgiving... What ails you, that you look not for majesty in God, seeing He created you by stages? Have you not regarded how God created seven heavens one upon another, and set the moon therein for a light and the sun for a lamp? And God causes you to grow out of the earth, then He shall return you into it, and bring you forth. And God has laid the earth for you as a carpet, and there of you may tread ways, ravines'." (71:5-20)

Obviously, it is not for everyone to be able to read

the ``book" of the universe. The Quran considers only men of knowledge to be capable of benefiting from the book of nature as can be seen from the following verse:

«الم‌تر ان اللّه انزل من السماء ماءً فاخرجنا بـه‌ثمرات مختلفاً الوانها و من الجبال جدد بيض و حمر مختلف الوانها و غرابيب سود و من الناس و الدواب و الانعام مـختلف الوانـه كـذلك انـما يـخشى‌اللّـه مـن عـباده العلماء...» (فاطر/۲۸ـ۲۷)

``Have you not seen how that God sends down out of heaven water, and therewith We bring forth fruits of diverse hues? And in the mountains are streaks white and red, of diverse hues, and pitchy black; men too, and beasts and cattleödiverse are their hues. Even so only those of His servants fear God who have knowledge; surely God is Almighty, All-forgiving" (35:27-28)

The Quran regards only men of knowledge as being capable of discerning the majesty and magnificence of God's creation and as possessing the humility produced by their knowledge of Divine Power and greatness. This point is stressed in other verses of the Quran:

«و تلك الامثال نضربها للناس و ما يعقلها الاالعالمون»
(عنكبوت/۴۳)

``And these similitudes ö We strike them for the people, but none understands them save those who know." (29:43)

«بل هو آيات بينات فی صدور الذين اوتوا العلم و ما يجحد بآياتنا الا الظالمون» (عنكبوت/۴۹)

``Nay; rather it is signs, clear signs in the breasts of those who have been given knowledge; and none denies Our signs but the wrongdoers." (29:49)

Obviously, as implied by the above-mentioned verses, understanding of the ``signs" of the Creator is considered possible only for the learned and the men of wisdom who have strived to fathom the secrets of nature and have acquired knowledge in their fields of study. Otherwise, only a superficial acquaintance with the ``book of creation" is not very revealing. A suitable initiation into this book of nature can only be achieved through such sciences as mathematics, physics, chemistry, astronomy, botany and zoology (which we shall refer to as `natural sciences'). It is with the aid of these and the rational sciences that we discover the laws of nature and unravel the wonderful order and

scheme of creation that underlies nature. It is in this light that we should read the verses of the Quran as the following:

«فارجع البصر هل ترى من فطور ثم ارجع البصر كرتين ينقلب اليك البصر خاسئا و هو حسير» (ملك/ ۴ـ۳)

"You see not in the creation of the All-merciful any imperfection. Return your gaze; Do you see any fissure? Then return your gaze, and again, and your gaze comes back to you dazzled, aweary." (67:3-4)

It means that the further does human knowledge make progress in understanding God's creation, the more His Greatness and Majesty will become obvious to men. Consider the following verse:

«سنريهم آياتنا فى الآفاق و فى انفسهم حتى يتبين انه الحق...» (فصلت/ ۵۳)

"We shall show them Our signs in the horizons and in themselves, till it is clear to them that He is the truth." (41:53)

In the above verse God promises revelation of His signs in the universe without and the world of spirit within to mankind in future so as to make them convinced that He is indeed the Truth.

4- Another reason for the study of the natural

phenomena and the scheme of creation is that the knowledge of the laws of nature and the characteristics of things and organisms can be useful for the improvement of conditions of human life. This aspect is emphasized by numerous verses of the Quran, of which we quote a few:

«و سخرلكم الليل و النهار و الشمس والقمر و النجوم مسخرات بامره ان فى ذلك لآيات لقوم يعقلون و ما ذرأ لكم فى الارض مختلفاً الوانه ان فى ذلك لآية لقوم يذكرون و هوالذى سخر البحر لتأكلوا منه لحماً طرياً و تستخرجوا منه حلية تلبسونها و ترى الفلك مواخر فيه و لتبتغوا من فضله و لعلكم تشكرون و القى فى الارض رواسى ان تميدبكم و انهاراً و سبلاً لعلكم تهتدون و علامات و بالنجم هم يهتدون»
(نحل/۱۶ـ۱۲)

"And He subjected to you the night and day, and the sun and moon; and the stars are subjected by His command. Surely in that are signs for people who understand. And that which He has multiplied for you in the earth of diverse hues. Surely in that is a sign for a people who remember. It is He who subjected to you the sea, that you may eat of it fresh flesh, and bring forth out of it ornaments for you to wear;

and thou mayest see the ships cleaving through it; and that you may seek of His bounty, and so that you will be thankful. And He cast on the earth firm mountains, lest it shake with you, and rivers and ways; so haply you will be guided; and waymarks; and by the stars they are guided." (16:12-16)

«الم تـروا ان اللّـه سـخّرلكم مـا فـى السـموات و مـا فى‌الارض و اسبغ عليكم نعمة ظـاهرة و بـاطنة و مـن الناس من يجادل في اللّه بغير علم و لاهدى و لا كتاب منير» (لقمان/۲۰)

"Have you not seen how that God has subjected to you whatsoever is in the heavens and earth, and He has lavished on you His blessings, outward and inward? And among men there is such a one that disputes concerning God without knowledge or guidance, or an illuminating book." (31:20)

«و سخّر لكم ما فى‌السموات و ما فى‌الارض جميعاً منه ان فى ذلك لآ يات‌لقوم يتفكرون» (الجاثيه/۱۳)

"And He has subjected to you what is in the heavens and what is in the earth, all together, from Him. Surely in that are signs for a people who reflect." (45:13)

«والذی خلق الازواج کلها و جعل لکم من الفلک و الانعام ما ترکبون لتستووا علی ظهوره ثم تذکروا نعمة ربکم اذا استویتم علیه و تقولوا سبحان‌الذی سخرلنا هذا و ماکنا له‌مقرنین» (زخرف/۱۳-۱۲)

"He who created the pairs all of them, and appointed for you ships and cattle such as you ride, that you be seated on their backs and then remember your Lord's blessing when you are seated on them, and say, 'Glory be to Him, who has subjected this to us, and we ourselves were not equal to it". (43:12-13)

According to the Quran, the study of the book of nature reveals to man its secrets and manifests its underlying coherence, consistency and order. It allows men to use the agency of knowledge to uncover the riches and resources hidden in nature and to achieve material welfare through his scientific discoveries. God has appointed man His vicegerent or deputy upon the earth and provided him with unlimited opportunities. It is for him to recognize his own potentialities and benefit from the opportunities and acquire the power and wisdom befitting his role as a 'deputy' of God and as a 'sign' of His wisdom and omnipotence:

«و هوالذی جعلکم خلائف الارض و رفع بعضکم

فوق بعض درجات ليبلوكم فيما آتاكم ان ربك سريع
العقاب و انه لغفور رحيم» (انعام/١۶۵)

"It is He who has appointed you viceroys on the earth, and has raised some of you in ranks above others, that He may try you in what He has given you. Indeed your Lord is quite in retribution, and He is Forgiving and Merciful." (6:165)

In fact, this station of being God's viceroy or deputy upon the earth has been bestowed upon man as a result of his capacity for acquisition of knowledge as borne out by this verse:

«علم آدم الاسماء كلها ثم عرضهم على الملائكة فقال
انبئونى باسماء هؤلاء ان كنتم صادقين» (بقره/٣١)

"He taught Adam all the names; then presented them to the angels; then He said: 'Tell me the names of those if you are right'." (2:31)

Criterion for the Usefulness of Any Science

So far we have tried to show that the recommendations of the Quran and *Sunnah* concerning the acquisition of knowledge is not restricted to the particular teachings of *Shari'ah,* but it equally applies to any knowledge useful for mankind. Now we are

going to set the criteria as to what sort of knowledge is useful. To do so, we have to find out and define what the obligation and goal of a Muslim in his earthly life is. The Quran says that all return to the Creator.

«الا الی اللّه تصیر الامور» (شوری/۵۳)

"...To Allah do all affairs eventually come." (42:53)

And the purpose of the creation of the jinn and human beings is that they worship and seek proximity to the Almighty:

«و ما خلقت الجن و الانس الا لیعبدون» (ذاریات/۵۶)

"And I have not created the jinn and the men except that they should worship Me." (51:56)

«و ان اعبدونی هذا صراط مستقیم» (یس/۶۱)

"And that you should worship Me; this is the right way." (36:61)

«و ما امروا الا لیعبدوا اللّه مخلصین له الدین...» (بینه/۵)

"And they were not enjoined anything except that they worship Allah, being sincere to Him in obedience." (98:5)

Therefore, the main objective of man should be seeking proximity to God and attaining His consent,

and focusing his activities in this direction. Anything that brings about this proximity or guides him in that direction is praiseworthy. Thus knowledge is useful only if it is an instrument for obtaining knowledge of God, and His pleasure and proximity; otherwise knowledge itself is an inscrutable veil *(hijāb-eakbar)*, whether it is linked with the sciences of nature or the sciences of the *Sharī`ah*. As the persian poet **Sa`dī** has put it:

جز یاد دوست هرچه کنی عمر ضایع است
جز سرّ عشق هرچه بگوئی بطالت است
سعدی بشوی لوح دل از نقش غیر او
علمی که ره بحق ننماید جهالت است

``Life is vain except when recalling Him; No words are good but (uttering) the secrets of love, Sa`di! Wash of your heart of all but Him, The knowledge not leading to Him is ignorance"

It is obvious that worshipping God is not only through prayers, fasting and so on. In fact, any move in the direction of proximity to God is considered as worship. One of the means to help man in his way towards God is knowledge, and of course a knowledge with this characteristics can only be considered valuable. By means of knowledge a Muslim can gain

proximity to God in various ways and manners.

First of all, he can increase his cognition of God. Our great **Prophet Muhammad** (SA) is related as having said:

«ان اللّه يطاع بالعلم و يعبد بالعلم و خيرالدنيا و الآخره مع العلم و شرّ الدنيا و الآخره مع الجهل»

"God can be worshipped and served by means of knowledge; bliss in this world and Hereafter comes through knowledge; and adversity of this world and Hereafter lies in ignorance."[29]

Secondly, he can effectively help in the advancement of "Islamic society and realization of Islamic goals":

«كلمة اللّه هى العليا» (توبه/۴۰)

"And the word of Allah is the highest." (9:40)

A tradition has been quoted from our great **Prophet** (SA):

«من جاءه الموت و هو يطلب العلم ليحيى به الاسلام كان بينه و بين الانبياء درجة واحدة فى الجنة»

"Should death occur to a man who is learning knowledge with the purpose of reviving Islam, his position in paradise will be (only) one stage below (that of) the prophets."[30]

Thirdly, he can guide other people. It is reported

from our dear **Prophet** (SA) as having said:

«قال (ص): رحم‌الله خلفائی، فقیل و من خلفاؤك؟
قال: الذین یحیون سنّتی و یعلّمونها عباداللّه»

"God will patronize my successors". He was asked, 'Who are your successors?' He answered, 'those who revive my traditions, and teach them to God's worshipers."[31]

The knowledge employed in the above mentioned ways is deemed to be useful; otherwise, it would not have any real value:

«ذلك بانّاللّه هوالحق و انّ ما یدعون من دونه الباطل...» (لقمان/۳۰)

"This is because Allah is the truth, and that which they call upon besides Him is the falsehood..." (31:30)

Our great **Prophet** (SA) is related as having said:

«من تعلّم علماً لغیراللّه و اراد به غیراللّه فلیتبوأ مقعده من النار»

"He who learns knowledge for other than God, and his aim be other than God, will abide in fire (hell)."[32]

«من ازداد علماً ولم‌یزدد هدیً لم‌یزدد من اللّه الاّ بعداً»

"One whose knowledge incrases but his

salvation does not keep pace with it, his remoteness from God increases."[33]

«ان‌اللّه عزوجل يقول تذاكر العلم بين عبادى مما تحيئ عليه القلوب الميتة اذا هم انتهوا فيه الى امرى»

"God, the Most exalted, has said: 'Knowledgeable discussions among my worshipers can enliven their hearts if it leads them towards my commands'." [34]

Any knowledge not helping man on his way to Allah is similar to the load of books carried on the back of a donkey:

«مثل الذين حملّوا التوراة ثم لم يحملوها كمثل الحمار يحمل اسفاراً» (جمعه/۵)

"The likeness of those who were charged with the Tawrah, then they did not observe it, is as the likeness of the ass bearing books..." (62:5)

Sayyid Qutb in his commentary on the verse (16:35) makes the following comment:

"In this verse the subject matter of the knowledge has not been mentioned, for it considers knowledge in general. Moreover, it implies that all kinds of knowledge are considered the gift of God, and any learned man should realise the origin of his knowledge

and turn his face towards God to thank Him. He should also utilise it in attaining the consent of God, who has granted him that knowledge. Therefore, knowledge should not stand between man and his creator, for knowledge is one of God's gifts to man. The knowledge which causes separation between man's heart and God is nothing but aberration and has gone astray from its origin and is oblivious of the destination. It brings happiness neither to its possessor nor to others, and has only gone away from its origin, deviated from its real direction, and has lost its way toward God."[35]

Hence we can draw the following conclusions:

a) All sciences, whether theological or natural are means for obtaining proximity to God, and as long as they play this role, they are sacred. But this sanctity is not intrinsic.

b) In this perspective, various sciences are not alien to each other because in their own way they interpret the various pages of the book of creation to us. As the eminent poet-sage Shaykh **Mahmūd Shabistarī** says:

بنزد آنکه جانش در تجلی است
همه عالم کتاب حق تعالی است

از او هر عالمی چون سوره‌ای خاص
یکی زان فاتحه و آن دیگر اخلاص

"To him whose spirit is enlightened,
The entire universe is a sacred book of the Most High:
Every sphere of universe is a different chapter,
One is the Opening Surah, and another the Surah of Unity."

In the pages of this Divine book, some chapters may have precedence and priority over others, but all of them are essential for the appreciation of God's signs in *'afaq* (horizons) and *anfus* (souls), that is in the universe without and the universe within.

Decline of Sciences in the Islamic World

In the early centuries of Islamic civilization, when this civilization was at its peak, the Muslim intellectuals approached the question of learning with a vision similar to the one discussed above. Different sciences were seen in a single perspective and considered interrelated as branches of the 'tree' of knowledge. The goal of all sciences was seen as discovery of unity and coherence in the world of nature. Accordingly, the source of all knowledge was considered to be one.

They utilized the experimental as well as the intellectual and intuitive approaches for understanding of various levels and stages of existence. During that period we find numerous examples of scholars who combined authority in religious sciences with encyclopedic knowledge of the natural sciences. Men like **Avicenna, `Umar Khayyām, Nasīr al-Dīn Tūsi** and **Qutb al-Dīn Shīrāzī** are some names among many. As long as this vision and perspective ruled Muslim scholarship and science, Muslims were in the vanguard of the human civilization and their cities were centers of specialized learning.

George Sarton admits[36] that during the period between A.D. 750 and 1100, Muslims were undisputed leaders of the intellectual world and between A.D. 1100 and 1350, the centers of learning in the Muslim world retained their global importance and attraction. After 1350 the European world began to advance and the Islamic world not only became stagnant but also failed to absorb the progress made outside it. The theological schools excluded all natural sciences from their curriculum except classical astronomy and mathematics. This restriction led to grave repercussions for the Islamic world. Here we point out

a few of these effects:

1- Whereas the Europeans were striving to unravel the hidden laws of nature and to discover ways of exploiting its treasures and resources, the Muslims set aside these activities, and left to others what they deserved most to handle. Today they have reached the point where they have to depend on America and Europe to satisfy their elementary needs. They remain largely unable to use their resources, which they continue to leave to foreigners to exploit.

2- Those Muslims who pursued the empirical sciences were mostly estranged from the religious sciences. As a result they lacked the Islamic world-view which was replaced by the atheistic vision that dominates the Western scientific tradition.

3- The elimination of the study of the natural sciences from the curricula of the religious schools (*madrasahs*) and the lack of direct touch with the sources of modern science on the part of religious scholars gave rise to two divergent intellectual currents in the Muslim world:

a) Some Muslims, under the influence of Western scientific and technical progress, and without any knowledge of the limitations of empirical sciences,

became singularly possessed with them... to the extent that they even tried to interpret the Quran and the Islamic traditions according to scientific conjectures. The Quranic exegeses written by Tantāwi and Sir Sayyid Ahmad Khān belong to this class. Others have gone still further claiming that all the finding of the modern sciences are found in the Quran and the texts of Islamic tradition *(hadīth)*. The claim, supposedly, was aimed at demonstrating the miraculous and Divine nature of the Quran. [37]

In the introduction to his exegesis of the Quran, Shaykh **Mahmud Shaltūt**, the late rector of al-Azhar University, writes:

> *"God did not send down the Quran to inform mankind of scientific theories and technological techniques... If we try to attempt a conciliation between the Quran and tentative scientific hypotheses, we will thereby subject the Quran to reversals of times to which all scientific theories and hypotheses are prone. That would result in presenting the Quran in an apologetic and defensive perspective. Whatever is mentioned in the Quran about the mysteries of creation and natural phenomena is intended to impel*

mankind to speculation and inquiry into these matters so that thereby their faith in it is enhanced."[38]

b) Some scholars of religion considered scientific theories as opposed to the doctrines of religion and accordingly set out to attack science. This resulted in the repercussion that many Muslims turned away from religion. Had the natural sciences not been exiled from the religious curricula, this tragedy would not have occurred. Any fruitful criticism of ideas based on scientific theories requires, in the first place, familiarity with the various disciplines of modern science, so that any unwarranted conclusions derived from scientific findings may be properly exposed and rejected. How is it possible to claim that the natural sciences result in man's estrangement from God, when the Quran unambiguously declares:

«ان فی خلق السماوات و الارض و اختلاف اللیل و النهارلآیات لاولی الالباب الذین یذکرون الله قیاماً و قعوداً و علی جنوبهم و یتفکرون فی خلق السماوات و الارض ربنا ما خلقت هذا باطلا سبحانك فقنا عذاب النار» (آل‌عمران/ ۱۹۱-۱۹۰)

"Surely in the creation of the heavens and earth and in the alternation of night and day there are

> *signs for men possessed of minds who remember God, standing and sitting and on their sides, and reflect upon the creation of the heavens and the earth: 'Our Lord, Thou hast not created this for vanity. Glory be to Thee! Guard us against the chastisement of the Fire'."* *(3:190-191)*

If the line of demarcation between religion and science is made clear, there is no reason for any conflict between these two. In fact they would complement each other. Science is like the lamp of life and religion its guide.

Proposals

We have seen how Islam has strongly emphasized the need for acquisition of knowledge in its widest sense, and how the Muslims, following the teachings of Islam, created a brilliant civilization and were the leaders of human intellectual advancement for centuries. We also saw how the separation of religion from science in Muslim societies caused the Muslims to abandon their role as intellectual leaders of mankind. But now that the Muslim community is showing gradual reawakening, and a new spirit is resurging in almost

every corner of the Muslim world, the time seems most suitable for taking decisive steps towards bringing about a scientific renaissance. In this context, we call the attention of our readers to the following proposals:

1- Like the scholars and scientists of the glorious Islamic civilization we should learn all useful sciences from others. We can liberate scientific knowledge from its attending Western materialistic interpretations and rehabilitate it in the context of Islamic world-view and ideology.

2- The kind of alliance which existed between religious and natural sciences at the peak of Islamic civilization should be re-established since, as has been pointed out, there is no conflict between the ends of religion and science. Religion teaches that all creation is oriented towards God, as is stated in the Quranic verse:

«يسبح لله ما فى السماوات و ما فى الارض الملك القدوس العزيز الحكيم» (جمعه/۱)

"All that is in the heavens and the earth magnifies God, the Supreme, the All-holy, the Almighty, the All-wise." (62:1)

Science, too, is engaged in an attempt to unravel a comprehensive unity in the laws of nature. The

present day physicists are involved in an effort to reduce all apparently independent forces of nature to a single fundamental one, and have had some success in this field.[39]

For the achievement of this goal, it seems inevitable that the latest scientific principles should be taught in theological centers, and, in the same way, religious sciences should be taught in universities at a comparatively advanced level. This will be instrumental in familiarizing Muslim researchers with the Islamic world-view. Moreover, it would give the opportunity to theological schools to utilise latest scientific findings for the clarification of the content of the law of the *Shari`ah.*

3- For the achievement of an all-round independence of the Muslim *`Ummah*, it is essential that all the Muslim countries take steps towards the training of specialists in all important scientific and industrial fields. Moreover, research centers should be established by all the Muslim communities so that the Muslim researchers can work without any anxieties or problems, and with all necessary facilities for research, so that they are not forced to take refuge in atheistic environments, and as a result compelled to put their

expertise in the service of others.

4- Scientific research should be thought of as a fundamentally essenial and not an ancillary pursuit. The Muslims should think of it as an obligation imposed upon them by the Quran so that they do not come to rely and be dependent on others.

Presently, the practice in most Muslim countries is to import all machinery along with a little knowledge of assembling its parts from Eastern and Western countries instead of making a serious attempt in fundamental scientific research. The present trend will never lead Muslim countries to scientific and technological self-sufficiency. Imported technology should be accompanied by indigenous research work.

5- There should be cooperation between Muslim countries in scientific and technological research. For this purpose, establishment of communication between their universities can serve as a preliminary ground. Moreover, joint research and development bodies (such as the Geneva-based **CERN** Organization) should be formed by the Muslim countries where Muslim scientists and research scholars can work together. There should be no nationalistic bias in this regard. Such centers were widely prevalent during the

glorious era of Islamic civilization.

All that has been done hitherto in this connection is more or less of a rudimentary nature. Now it is time for a decisive step in this direction.

Notes and Sources

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CHAPTER 2

THE SIGNIFICANCE OF PHYSICAL AND BIOLOGICAL SCIENCES IN ISLAMIC PERSPECTIVE

Introduction

In the Holy Quran the word *al-`ilm*, knowledge, and its deriva- tives are used more than 780 times. The first few verses that were revealed to the **Prophet Muhammad** (SA) mention the importance of reading, pen, and teaching for human beings:

«اقرأ باسم ربك‌الذی خلق خلق‌الانسان من علق اقرأ و ربك الاکرم الذی علّم بالقلم علّم الانسان ما لم‌یعلم»

(علق/۵-۱)

``Read: in the name of your Lord who created. He created man from something which clings, Read and your Lord is the most generous. Who taught with pen. Taught man what he knew not..." (96:1-5)

And about the creation of **Adam**, the Quran says that

even the angels bowed before Adam after he was taught the names:

«و علّم آدم الاسماء كلها ثم عرضهم على الملائكة فقال انبئونى باسماء هؤلاء ان كنتم صادقين قالوا سبحانك لاعلم لنا الا ما علّمتنا انك انت العليم الحكيم» (بقره/٣٢ـ٣١)

"And He taught Adam the names, all of them; then He presented them unto the angels and said: Now tell Me the names of these if you speak truly. They said 'Glory be to Thee, We know not save what Thou hast taught us. Surely Thou art the All-knowing, the All-Wise'!" (2:31-32)

The Quran says that those who know are not comparable to those who do not know:

«... قل هل يستوى الذى يعلمون و الذين لايعلمون...» (زمر/٩)

"Say: Are those who know and those who do not know alike?" (39:9)

And that only the learned understand:

«و تلك الامثال نضربها للناس و ما يعقلها الاالعالمون» (عنكبوت/٤٣)

"And these examples We set forth for the people, but none understands them save those

who know." (29:43)

And that only those who have knowledge stand in awe of God:

«... انما يخشى‌الله من عباده العلماء...» (فاطر/ ٢٨)

"Of all His servants, only those endowed with knowledge stand in awe of God." (35:28)

In the Islamic tradition, too, there are many words of praise for knowledge and the learned. A number of traditions are attributed to the **Prophet Muhammad** (SA) in this regard, some of which are quoted below:

«طلب العلم فريضة على كل مسلم»

"It is an obligation for every Muslim to seek knowledge."[1]

«اطلبوا العلم ولو بالصين»

"Seek knowledge even if it be in China."[2]

«اطلبوا العلم من المهد الى اللحد»

"Seek knowledge from cradle to grave."[3]

«العلماء ورثة الانبياء»

"Scholars are the heirs of the prophets."[4]

«يوزن يوم‌القيامة مداد العلماء و دم الشهداء فيرجح مداد العلماء على دم الشهداء»

"The ink of the learned will be weighed with the blood of the martyrs on the Resurrection Day; and, then, the ink of the learned would be

preferred to the blood of the martyrs."[5]

It has been a subject of fundamental importance from the carly days of Islam as to which kind of knowledge Islam recommends; is there any specific kind of knolwedge to be sought? Some well-known Muslim scholars have counted as praisworthy only those branches of knowledge which are directly connected with religion. As for other types of knowledge they hold the view that it is up to the community to decide which of them are essential for the sustenance and welfare of the community. We believe that there can be no restriction on the acquisition of knowledge, and, if there were any limitations of this kind, our Holy Prophet (SA) would have mentioned them. Furthermore, on the basis of the Quran and the Islamic tradition, one can hold that the recommended type of knowledge itself embraces a wide range of subjects.

According to a tradition, Imam **Ja`far al-Sādiq** (AS), while addressing himself to Mufaddal ibn `Umar clearly described the vast domain of Islamic Science:

«فكّر يا مفضّل، فيما اعطى الانسان علمه و ما منع،
فانه أعطى علم جميع ما فيه صلاح دينه و دنياه. فمما
فيه صلاح دينه معرفة الخالق تبارك و تعالى بالدلائل و

الشواهد القائمة فـى الخـلق، و مـعرفة الواجب عـليه من العـدل عـلى النـاس كـافة، و بـر الوالديـن، و أداء الامانة، و مؤاساة أهل الخلة، و أشباه ذلك مما قد توجد معرفته و الاقرار و الاعتراف به فى الطبع و الفطرة، من كل أمة موافقة او مخالفة. و كذلك أعطى عـلم مـافيه صلاح دنياه كالزراعه، و الغراس، و استخراج الارضين، و اقتناء الاغنام، والانعام، و استنباط المياه، و مـعرفة العـقاقير التـى يـستشفى بـها مـن ضـروب الاسـقام، و المعادن التى يستخرج منها أنواع الجواهـر، و ركـوب السفن و الغوص فى البحر، و ضروب الحيل فى صيد الوحش و الطير و الحيتان، و التصرف فى الصناعات، و وجوه المتاجر و المكاسب و غـير ذلك مـما يـطول شرحه و يكثر تعداده، مما فيه صـلاح أمـره فـى هـذه الدار، فأعطى علم ما يصلح به دينه و دنياه، و منع مـا سوى ذلك مما ليس فى شأنه ولا طاقته أن يعلم، كعلم الغيب و ما هو كائن و بعض ما قد كان... فانظر كـيف أعطى الانسان علم جميع مايحتاج اليه لدينه و دنياه، و حجب عنه ما سوى ذلك، ليعرف قدره و نقصه. و كلا الامرين فيهما صلاحه...»

``*O,* **Mufaddal!** *remember what God has granted man to learn, and what He has forbidden him from knowing. Man may acquire the knowledge of what is good for his life in this world and his faith. In the sphere of religious interests of man*

are: knowledge of the God, Almighty, through signs and strong proofs that are manifest in the creation; obligatory knowledge of the issues which lead to just treatment of fellowmen; to parents, trustworthiness, helping the poor, and the awareness of the values and principles that every human being, whether believing in God or unbelieving Him, intrinsically and naturally cherishes. Man has also been granted capacity of knowing what is good for his worldly interests, such knowledge includes the foolowing: agriculture, plantation, cultivation of land, animal husbandry, utilization of pharmaceutically useful plants, exploitation of mineral resources, navigation and diving the seas, management of various industries, a variety of trades and professions, and many other disciplines profitable to man in this world. Therefore, God has made man capable of attaining all knowledge that he needs for the benefit of his worldly life and faith and He has forbidden what is unfit and beyond his reach such as: occultation, prevision, knowledge of certain past events.... So, look and reflect on

how God granted man some capabilities to get what he needs for this world and his religion, while He has deprived him of other abilities so that he may appreciate what he has, and be aware of what he lacksöboth of which are to his benefit."[6]

The only limit set to the acquisition of knowledge in Islam is that Muslims should seek useful knowledge. Our great **Prophet** (SA) is reported as having said:

«اللّهم انّى اعوذ بك من علم لا ينفع»

"My Lord, save me from the useless knowledge."[7]

Any knowledge helping man in performing his God-assigned role in this world is useful, other than that is considered useless knowledge. The following statement which has been reported from Imām **al-Sādiq** (AS), may be used as a criterion to distinguish between useful and useless sorts of knowledge:

«فكلّ ما يتعلّم العباد او يعلّمون غيرهم من صنوف الصناعات مثل الكتابة والحساب والتجارة والصياغة والسراجة والبناء والحياكة والقصارة والخياطة و صنعة صنوف التصاوير ــ ما لم يكن مثل الروحانى ــ و انواع صنوف الالات التى يحتاج اليها العباد التى منها

منافعهم و بها قوامهم و فيها بلغة جميع حوائجهم
فحلال فعله و تعليمه و العمل به و فيه لنفسه او لغيره و
ان كانت تلك الصناعة و تلك الالة قد يستعان بها على
وجوه الفساد و وجوه المعاصى و يكون معونة على
الحق والباطل. فلا بأس بصناعته و تعليمه،نظير الكتابة
التى هى على وجه من وجوه الفساد من تقوية معونة
ولاة ولاة الجور. وكذلك السكين والسيف و الرمح
والقوس وغير ذلك من وجوه الآلة التى قد تصرف الى
جهات الصلاح و جهات الفساد و تكون الة و معونة
عليهما، فلا بأس بتعليمه و تعلمه و اخذ الاجر عليه و فيه
و العمل به و فيه لمن كان له فيه جهات الصلاح من
جميع الخلائق و محرم عليهم فيه تصريفه الى جهات
الفساد و المضار، فليس على العالم و المتعلم اثم ولا
وزر لما فيه من الرجحان فى منافع جهات صلاحهم و
قوامهم و بقائهم به و انما الاثم والوزر على المتصرف
بها فى وجوه الفساد والحرام. و ذلك انما حرم اللّه
الفساد التى حرام هى كلها التى يجىء منها الفساد محضا
نظير البرابط و المزامير و الشطرنج و كل ملهوبة
والصلبان والاقسام و ما اشبه ذلك من صناعات
الاشربة الحرام و ما يكون منه و فيه الفساد محضا و لا
يكون فيه و لا منه شىء من وجوه الصلاح فحرام
تعليمه و تعلمه و العمل به و اخذ الاجر عليه و جميع
التقلب فيه من جميع وجوه الحركات كلّها. الا ان تكون
صناعة قد تتصرف الى جهات الصنائع، و ان كان قد

يتصرف بها و يتناول بها وجه من وجوه المعاصي. فلعلّه لما فيه من الصلاح حلّ تعلّمه والعمل به، و يحرم على من صرفه الى غير وجه الحق والصلاح».

``Any sort of science and technology which eliminates man's needs or is useful to God's servants and helps them to continue their lives and meet their daily needs, is permitted by religion to teach or to learn. For example they are: writing, accounting, commerce, work of a goldsmith, saddle-making, brick-laying, knitting, tailoring, painting and drawing (with the exception of animate beings) and making tools required by people. But if such knowledge or skill could be used for vicious and sinful purposes as well as rightful and noble deeds, such as writing which may be abused for strengtening oppressive rulers, is not forbidden; so is making knives, swords, spears, bows and arrows which can be used in both good and bad ways. Teaching and learning such trades or receiving fees for their instruction, provided that it is for the benefit of God's servants, is permissible; but their use in harmful or vicious ways is forbidden; in either case it is not a sin

for man to teach or learn such a trade, for utility of these tools is greater than the harm caused by their abuse, and the continuity of social life depends on them. Their misuse, however, is a sinful deed. This is because God has forbidden us to go after anything which is totally corrupt and has no useful result. Thus, it is forbidden to make strings (of musical instruments) flutes, chess, various instruments of entertainment and pleasure, crosses, idols or the like, and intoxicating drinks, and anything causing disturbance or harm, or ending in corruption and having no use for man, is forbidden to teach, to learn or impart it to others and to obtain fees or wages for them. If there is a craft or industry that is used for other industries or crafts, even if it is sometimes used for sinful purposes, it would be permissible to be developed, but using it in the wrong way would be unlawful."[8]

Islam and Science

In this section, we intend to deal with the reasons that justify the study of the sciences (of nature) from the

Islamic veiw-point and then we shall try to see how far the Islamic conception of knowledge is compatible with sciences of nature. The study of the Quran and the Islamic tradition indicates that for two fundamental reasons Islam recognizes the significance of science:

1- The role of science in knowing God.

2- The role of science in the stability and advancement of the Islamic society.

1- The Role of Science in Knowing God

In the Holy Quran there are more than 750 verses which refer to natural phenomena, and people are asked to think over them in order to recognize Allah through His signs. These verses can be divided into the following categories:

i) The verses that either describe the constituent elements of objects or enjoin man to discover them. For example we read in the Quran:

«فلينظر الإنسانممّ خلق». (الطارق/٥)

"So let man consider of what he is created." (86:5)

«والله خلق كلّ دابّة من ماء». (النور/٤٥)

"And Allah has created every living creature

from water." (24:45)

«انّــا خــلقناالانســان مــن نطفة امشــاج نــبتليه فــجعلناه سميعابصيرا» (الانسان/۲)

"We created man of a sperm-drop, a mingling, trying him; and we made him hearing, seeing." (76:2)

ii) The verses that either give an account of the manner of creation of material objects or enjoin man to discover their genesis. The following are typical of this category:

«و هو الذی خلق السموات والارض فی ستّة ایّام و کان عرشه علی الماء...» (هود/۷)

"And it is He who created the heavens and the earth in six periods, and His Dominion was upon the waters..." (11:7)

«و لقد خلقنا الانسان من سلالة من طین* ثـم جـعلناه نطفة فی‌قرار مکین* ثم خلقنا النطفة علقة فخلقنا العلقة مضغة فخلقنا المضغة عظاما فکسونا العظام لحـما ثـم أنشأنــاه‌خــلقاآخر فــتبارک اللّـه احســن الخـالقین». (المؤمنون/ ۱۲ـ۱۴)

"And certainly we created man of an extract of clay, then We made him a small life-germ in a firm resting place. Then We made the life-germ a clot, then We made the clot a tissue, then We

made the tissue bones, then We cloted the bones with flesh, then We caused it to grow into another creation, so blessed be Allah, the best the Creators." (23:12-14)

«اولم يرالذين كفروا ان السموات والارض كانتا رتقا ففتقناهما...» (الانبياء/٣٠)

``Do not those who disbelieve see that the heavens and the earth were closed up which we then parted asunder..." (21:30)

«خلق السموات بغير عمد ترونها والقى فى الارض رواسى ان تميد بكم...» (لقمان/١٠)

``He created the heavens without pillars you can see, and He cast on the earth firm mountains, lest it shakes with you..." (31:10)

«تم استوى الى السماء و هى دخان» (حم/١١)

``Then He directed himself to the heaven when it was a vapour..." (41:11)

«افلا ينظرون الى الابل كيف خلقت* و الى السماء كيف رفعت* و الى الجبال كيف نصبت* والى الارض كيف سطحت.» (الغاشيه/١٧ـ٢٠)

``Will they not then consider how the camel was created, how heaven was lifted up, how the mountains were hoisted, how the earth was outstretched." (88: 17-20)

iii) The verses in which man is enjoined to discover how our physical universe came into existence. The following are typical of this kind of verses:

«قل سيروا فى الارض فانظروا كيف بدأالخلق»
(العنكبوت/ ٢٠)

"Say: journey in the earth, then behold how He originated creation." (29:20)

«أولم يروا كيف يبدىء اللّه الخلق ثم يعيده»
(العنكبوت/ ١٩)

"Have they not seen how God originates creation, then brings it back again." (29:19)

iv) The verses in which man is enjoined to study natural phenomena. The following verses typify this category:

«الم تر ان اللّه انزل من السماء ماء فسلكه ينابيع فى الارض ثم يخرج به زرعا مختلفا الوانه، ثم يهيج فتريه مصفرا ثم يجعله حطاما ان فى ذلك لذكرى لاولى الالباب» (الزمر/ ٢١)

"Do you not see that Allah sends down water from the heaven (cloud), then makes it go along in the earth in springs, then brings forth there with herbage of various colours, then it withers so that you see it becoming yellow, then He makes it a thing crushed and broken into

pieces? Most surely there is a reminder for the men of understanding." (39:21)

«ان فــى خـلق الـسـموات والارض واخـتلاف اللـيل
والنهار والفلك التى تجرى فى البحر بما ينفع الناس و ما
انزل الله من السماء من ماء فاحيا به الارض بعد موتها
و بث فيها من كل دابة و تـصريف الريـاح والـسحاب
المسخر بين الـسماء والارض لآيـات لقـوم يـعقلون»
(البقرة/١۶۴)

``Surely in the creation of heavens and the earth and the alternation of night and day and the ship that runs in the sea with profit to men, and the water God descends down from heaven therewith reviving the earth after it is dead and his scattering abroad in it all manner of crawling things and the turning about of the winds and the clouds compelled between heaven and earth, there are signs for a people having understanding." (2:164)

v) The verses in which God swears by various natural objects. Here we cite some examples:

«والشمس وضـحيها* والقـمر اذا تـليها* والنـهار اذا
جـليها* والليـل اذا يـغشيها* والسـماء و مـا بـنيها*
والارض و ماطحيها...» (الشمس/١ـ۶)

``By the sun and his morning brightness, and by

the moon when she follows him, and by the day when it displays him and by the night when it enshrouds him and by the heaven and that which built it and by the earth and that which extended it." (91:1-6)

«فلا اقسم بمواقع النجوم* و أنه لقسم لو تعلمون عظيم» (الواقعه/۷۵ـ۷۶)

"But nay! I swear by the fallings of stars. And most surely it is a very great oath if you only know." (56:75-76)

vi) The verses in which by reference to some natural phenomena the possibility of the occurence of Resurrection has been explained. Examples:

«يا ايّها الناس ان كنتم فى ريب من البعث فانا خلقناكم من تراب ثم من نطفة من علقه ثم من مضغة مخلقة و غير مخلقة... و ترى الارض هامدة، فاذا انزلنا عليها الماء اهتزت و ربت و انبتت من كل زوج بهيج». (الحج/۵)

"O people! If you are in doubt about the raising, then surely we created you from dust, then from a small life-germ, then from a clot, then from a lump of flesh, complete in make and incomplete... and you see the earth's sterile land but when We send down on it the water, it

stirs and swells and brings forth of every kind a beautiful herbage." (22:5)

اولیس الذی خلق السموات والارض بقادر علی ان یخلق مثلهم بلی و هو الخلاّق العلیم» (یس/۸۱)

``Is not He who created the heavens and the earth able to create the like of them? Yes! And He is the Creator (of all), the Knower." (36:81)

«یخرج الحیّ من المیّت و یخرج المیّت من الحی و یحیی الارض بعد موتها وکذلك تخرجون»

(الروم/۱۹)

``He brings forth the living from the dead and brings forth dead from the living, and gives life to the earth after its death, and thus shall you be brought forth." (30:19)

vii) The verses that emphasize the thoroughness and orderlines of the creations of Allah. The following verses envisage this point:

«و تری الجبال تحسبها جامدة و هی تمر مر السحاب، صنع الله الذی اتقن کل شیء...» (النمل/۸۸)

``And you shall see the mountains, that you supposed fixed, passing by like cloudsöGod's handiwork, who has created everything very well..." (27:88)

«الذی خلق سبع سموات طباقا، ما تری فی خلق

الرحمن من تفاوت، فارجع البصر هل ترى من فطور*
ثم ارجع البصر كرتين، ينقلب اليك البصر خاسئا و هو
حسير» (الملك / ٣ـ۴)

``Who created seven heavens one upon another. You see no imperfection in the creation of the Beneficient God; then look again, can you see any disorder? Then return back the eye again and again, your look shall come back to you dazzled, aweary." (67:3-4)

«والارض مددناها والقينا فيها رواسى وانبتنا فيها مـن
كل شيء موزون» (الحجر/١٩)

``And the earth, We stretched it forth, and cast on it firm mountains, and We caused to grow in it of everything justly weighed." (15:19)

«و خلق كل شيء فقدره تقديرا» (الفرقان/٢)

``And He created everything, then, He ordained it very exactly. (25:2)

«خلق السموات والارض بالحق يكور الليل على النهار
و يكور النهار على الليل و سخر الشـمس والقـمر كـل
يجرى لاجل مسمى...» (الزمر/۵)

``He created the heavens and the earth in truth, wrapping night about the day, and wrapping day about the night, and He has subjected the sun and the moon, each of them running to an

assigned term." (39:5)

«و ما خلقنا السماء والارض و ما بينهما لاعبين» (الانبياء/١۶)

``And we did not create the heaven and the earth and what is between them sport." (21:16)

viii) The verses that explain the harmony in which man exists with the rest of the physical universe and the subservience of what is in the earth and in the heaverns to man. The following exemplify this type of verses:

«هو الذی خلق لکم ما فی الارض جمیعا» (البقرة/٢٩)

``It is He who created for you all that is in the earth." (2:29)

«و سخر لکم مافی السموات و ما فی الارض جمیعا منه...» (الجاثیة/١٣)

``And He has made subservient to you what is in the heavens and what is in the earth, all together from him..." (45:13)

«هو الذی جعل لکم الارض ذلولا فامشوا فی مناکبها و کلوا من رزقه...» (الملک/١۵)

``It is He Who made the earth submissive to you; therefore walk in its tracts, and eat of His provisions..." (67:15)

«والانعام خلقها لكم فيها دفء و منافع و منها تأكلون»
(النحل/٥)

"And He created the cattle for you; you have in them warm clothing and many advantages, and of them you eat." (16:5)

«و انزلنا الحديد فيه بأس شديد و منافع للناس»
(الحديد/ ٢٥)

"And We sent down iron, wherein is great might, and many uses for men..." (57:25)

«و هو الذى جعل لكم النجوم لتهتدوا بها فى ظلمات البرّ والبحر، قد فصّلنا الآيات لقوم يعلمون»
(الانعام/٩٧)

"And He is who has made the stars the stars for you that you might follow the right way thereby by the darkness of the land and sea; truly we have made plain the commu- nications for a people who know." (6:97)

In these verses the Almighty invites His servants to see and reflect upon the natural phenomena and, through the observation of order and coordination in the system of creation and its wonders, get closer to Him. It is obvious that for having a clear conception of the issues referred to in these verses, and for the discovery of the answers to the problems therein one

has to be familiar with the natural and physical sciences because a superficial knowledge of natural phenomena cannot reveal the grandeur of Creation to man. It is for this very reason that in the verses 27-28 of the chapter *Fātir*, after describing a number of natural phenomena, God says:

«... انّــــما يــخشى اللّــه مــن عــباده العــلماء...»

(فاطر/٢٧ـ٢٨)

"...of His servants only those who are possessed of knowledge fear Allah..." (35:27-28)

«بل هو آيات بينات فى صدورالذين اوتوا العـلم...»

(العنكبوت/٤٩)

"Nay, these are clear signs in the breasts of those who have been given knowledge..." (29:49)

On the other hand, the knowledge of natural phenomena is effective in leading us closer to God only if we have faith. The following verse asserts this point beautifully:

«قل انظروا ماذا فـى السـموات والارض و مـا تـغنى الايات والنذر عن قوم لايؤمنون» (يونس/١٠١)

"Say: Behold what is in the heavens and in the earth; but neither signs nor warnings avail a people who do not believe." (10:101)

One should not forget, however, that the Quran is not a handbook of experimental science and if it explains some natural phenomena, it is because of the following reasons:

i) The study of natural phenomena and wonders of creation strengthens man's faith in God.

ii) By becoming familiar with the opportunities that God has provided for man, he becomes more knowledgeable about Allah and by obtaining just benefits from them, he can offer his gratitude to God.

In fact, it was due to the encouragement of the Quran for the study of natural phenomena that Muslim scientists became deeply involved in this field. The development of Islamic civilization, too, was to a great extent indebted to the Quranic outlook. The prominent Muslim scientists of the past have acknowledged their indebtedness to the Quran, an indebtness that even some Western scholars have acknowledged.

For example **Levy**, in *The Social Structure of Islam*, says:

> *"Apart from a small number of investigators inspired by Greek philosophic ideals, the Muslims who engaged in the pursuit of science*

> *did so... in order to discover, in the wonders of nature, the signs or tokens of the glory of God."*[9]

George Sarton, in his book *Introduction to the History of Science* writes that in order to fully conceive the motive behind the fields of science, one should note the axial role of the Quran for them.[10]

In his book, the *Kitāb al-Tahdīd Nihāyāt al-'Amākin,* **al-Bīrūnī** writes:

> *``When a person decides to discriminate between truth and falsehood, he has to study the universe and find out whether it is eternal or created. If somebody thinks that he does not need this kind of knowledge, he is however in need of thinking about the laws that govern our world, in part or in its entirety. This leads him to know the truth about them, and paves the way for knowing the being, who directs and controls the universe, and His attributes. This is, in fact, the kind of turth that God enjoined His knowledgeable servants to search for, and Allah spoke the truth when He said:*
>
> «... و يتفكرون فى خلق السموات والارض، ربّنا ما خلقت هذا باطلا...» (آل‌عمران/١٩١)

"...And reflect upon the creation of the heavens and the earth: our Lord Thou has not created this in vain." (3:191)

This verse contains what I explained in detail, and if man works according to it, he can have access to all branches of knowledge and cognition."[11]

Also in **al-Bīrūnī** *Kitāb al-Jamāhir* we read;

"Sight connects what we see to the signs of Divine wisdom in creation and deduces the existence of the Creator."[12]

In that part of his diary which belongs to the year 417 *Hijrah*, **Ibn al-Haytham** writes:

"From my very childhood I have been wondering about various peoples (i.e. sects) and their beliefs. Each sect has its own opinions and beliefs according to the principles of its faith. I, therefore, began to doubt the views of various sects, and I am now convinced that truth is one and the same and their differences are based on the ways and methods of finding the truth. Anyhow, having gained an insight into the intellectual basis, I decided to search for the truth and tear away the veil of superstitions and

doubts, which an illusive vision has cast on the people, and so that the doubting and sceptical people may lift their gaze freed from the labyrinth of scepticism. Afterwards, I decided to discover as to what is that brings us closer to God, what pleases him most, and what makes us submissive to his ineluctable Will. My feeling were akin to those of Gallen, which he describes in the seventh chapter of his Hilat-ul-bur. While addressing his pupils, he says:

'I am not aware of the feelings, thoughts, and sensations which have guided me since my childhood. Call it what you mayöa matter of chance, or intuition vouchsafed by Almighty God, or madness. You may attribute the source of my inspiration to any of the three. I shunned the publications, looked at them with contempt and derision and did not incline toward their company. I constantly sought knowledge and truth, and it became my belief that for gaining access to the effulgence and closeness of God, there is no better way than that of search for truth and knowledge.' At last I was led to the conclusion that Truth can only be discovered by

the formulations of theories, the content of which is sense and their form is intellectual equipment. I found such theories present in the logic, physics, and theology of Aristotle...'

When this matter became clear, I decided to understand philosophy, which consisted of mathematics, physics and metha physics, whole-heartedly... Therefore, I learnt their principles and in that way I acquired skill in their derivatives... Realising the mortality of man,... I explained and summarised whatever knowledge I had acquired in these three disciplines, and wrote some books in the explanation of the difficulties in relation to their derivatives. This has been going on till now, i.e. 417 A.H."[13]

We see that Muslim scientists' quest for knowledge of natural phenomena was due to the fact that they considered this course of study to be one of the best ways of approaching God. They believed that by studying signs of God in nature can discover the interrelation between all parts of the universe and the Unity hidden behind this world of multiplicity, and this in turn leads them to the unique Creator. In the

glorious period of Islamic civilization, Muslim scientists assimilated cosmological sciences of their time into their own knowledge, because these sciences, too,in their their view, were trying to demonstrate the unity of nature and were searching for the primary Cause of things, and thus were conformed to the Islamic perspective. In this process, however, they first drew out the foreign elements, and then infused the rest with the Islamic concepts. Furthermore, Muslim scientists employed both experimental and theoretical methods of investigation.

Unfortunately, this kind of outlook toward the sciences of nature was gradually discarded in the Islamic world and Muslims neglected the recommendations of the Holy Quran about the study of nature and the taking advantage of the opportunities that God has provided for man. On the other hand, non-Muslims studied these subjects, and this gave them mastery over the rest of the world. An important consequence of this grave mistake was that a large gap appeared between religion and the mundane affairs of Muslims and they were forced to try to learn science and technology from the West. A by-product of this was the infiltration of undersirable

features of Western civilization into the Islamic world. As a consequence of these unfortunate facts, Muslims have reached a point where they have lost their spiritual qualities, and are not capable of controlling their mundane affairs without foreign assistance.

2- The Role of Science in the Stability and Advancement of an Islamic Society

According to the Holy Quran, Islam is a Universal religion:

«قل يا ايها الناس إنّى رسول اللّه اليكم جميعا»
(الاعراف/١٥٨)

"Say: O mankind surely I am the Messenger of God to you all." (7:158)

«و ما ارسلناك الا كافة للناس بشيرا و نذيرا» (سبأ/٢٨)

"And we have not sent you but to all mankind as a bearer of good news and as a warner." (34:28)

And the aim of Islam is to establish a monotheistic society in which God's word is the highest:

«و جعل كلمة الذين كفروا السفلى و كلمة اللّه هى
العليا» (التوبة/٤٠)

"And He made the word of the unbelievers the lowest, and God's word the uppermost." (9:40)

In order to establish such a society and to keep it immune from the dangers of the unbelievers, the Islamic world has to be completely independent. The following verse envisages this point:

«و لن يجعل اللّه للكافرين على المؤمنين سبيلا»
(النساء/١٤١)

"And God will not grant the unbelievers any way over the believers." (4:141)

Moreover, our **Prophet Muhammad** (SA) is reported to have said:

«الاسلام يعلوا و لا يعلى عليه»

"Islam is superior to (all) others and nothing can surpass it."[14]

Obviously, in order to guarantee the superiority of Islamic policy over others, Muslims should try to make themselves independent and self-sufficient. It is for this reason that Muslim jurisprudents have given the verdict that any deed leading to the supremacy of unbelievers over the Muslims is forbidden.[15] Moreover, they have decreed that it is a duty of an Islamic society to provide whatever is needed for the sustenance of the society. In the Holy Quran itself Muslims are enjoined to prepare and equip themselves in every respect to face the challenge of the forces of

unbelievers:

«واعدوا لهم ما استطعتم من قوة و من رباط الخيل ترهبون به عدو الله و عدوكم...» (الانفال/٦٠)

"And prepare against them whatever force and strings of horses you can to terrify thereby the enemy of God and your enemy." (8:60)

Today, everything revolves around the axis of science and technology Therefore, in order to be independent and self-reliant, Islamic policy should provide all scientific and technological capabilities that are essential for its self-sufficiency and glory. This involves training of specialists of high calibre in every important field of science and technology, and equipping them with the best technical facilities. Unfortunately, since Muslims have overlooked the need to equip themselves with scientific and technological knowledge and have given way to others in these fields, they have become more and more dependent for their very necessities of life on non-Muslims. **Ibn Ikhwah** (Ibn al-`Ukhuwwa), a *Shāfi'ī* jurisprudent of the seventh century after *Hijrah*, tells us in his book *The Ma`ālim al-Qurba fī Ahkām al-Hisba:*

"Medicine is an art both theoretical and

practical the acquisition of which is permitted by the law for the reason that thereby health is safeguarded and weaknesses and sicknesses repelled from this noble structure [of the body]. It [the practice of medicine] is one of the duties for which the community is responsible and yet there is no Muslim to fulfil it. Many a town has no physician who is not a dhimmī [A "protected" non-Muslim-Christian, Jew or Zoroastrian] belonging to a people whose evidence about physicians is not accepted [in the courts] where the laws of medicine are concerned. No [Muslim] occupies himself with it; everyone repairs to the study of the law and more particulary that portion of it given over to disputes and litigiousness and the town is full of legists occupied with granting fatwās and giving replies to legal queries on points which arise. Can there be any reason for the faith's permitting a state of things in which large numbers occupy themselves with one particular duty while another is neglected, except that by medicine there is no access to judgeships and governorships whereby it is possible to claim

superiority over rivals and to acquire authority over enemies? Alas, knowledge of the faith is blotted out."[16]

If Ibn al-`Ukhuwwa was complaining in the seventh century after *Hijra*, that most of the physicians in the Muslim society of his time were Jews or Christians, and Muslims were neglecting this compulsory duty, today, we see that Muslims are unable to use their resources and they let others exploit them. As the famous Pakistani poet **Iqbal** states:

دیروز مسلم از شرفِ علم سر بلند

امروز پشت مسلم و اسلامیان خم است

``The Muslim of yesterday was proud and esteemed for his knowledge, (but) today the believers' and Muslims' back is bent (before others)".

Here one asks, ``While the Quran says that unbelievers will in no way have domination over the believers, why are Muslims now ruled by unbelievers? The answer may be found in the fact that Muslims today are not real believers, and they overlook their Islamic obligations. They neither have the unity nor do they go after knowledge and other provisions recommended by the Holy Quran:

«واعداو لهم مااستطعتم من قوة و من رباط الخيل
ترهبون به عدوالله و عدوكم...» (الانفال/ ٦٠)

"And prepare against them what force you can and horses tied at the frontier, to frighten thereby the enemy of Allah and your enemy..." (8-60)

Despite all the categorical orders of the Quran, let us see, what we have done in the way of preparing ourselves and exulting Islamic Society. While Islam does not allow the dominance of the unbelievers over believers even in a simple matter, like inheritance, [17] why are Muslims so entirely dependent on the products of others?

It will be useful to have a look at the present state of the Islamic world.[18]

There are more than 50 Islamic countries with 1/5 of the total population of the world, and covering 1/5 of the continents of the earth. They possess fifty percent of the oil reserves as well as other natural resources of the world. On the other hand, the Islamic nations depend on non-Islamic countries for their food, technology, science and defence requirements. They consume more food than they can produce. Our export consists mainly of raw materials, the prices of

which are falling continually; while our imports are predominantly manufactured products, the prices of which are rising day by day.

It is obvious that in this deplorable condition the Islamic countries will continue their dependence on the West until they fully equip themselves in the way of providing their own food and technology, and even this has to be done in the form of a mobilized combat, without which there seems to be little likelihood of the elimination of Western cultural and economic influence over Islamic countries. Imām **Khomeinī** in his book *Tahrīr al-Wasīlah* says:

> *"Should the danger of political and economic domination of the enemy increase to the extent that it might bring the Islamic society under its political and economic yoke (causing humiliation and shame to Islam and Muslims and weakening them), it would be incumbent on all Muslims to defend their cause with the means and tools similar to those of the enemy."*[19]

Here, we find it necessary to mention two important points:

a) From the Islamic viewpoint it is faith which

guarantees the proper use of knowledge. In the Quran, knowledge and faith stand side by side. In the first verse revealed to the Prophet (S) reading has been recommended; but reading stands next to the name of the Creator, which means acquiring knowledge should be in God's name, not in that of satan. knowledge together with faith leads to rightousness; whereas knowledge in the hand of unbelievers is a means of destruction. Many abuses of knowledge have been made by the unbelieving scientists. A tradition related to our **Prophet**(SA) says:

«الا ان شر الشر شرار العلماء و ان خير الخير خيار العلماء»

``Surely, the worst of all evils are wicked scholars and the best of all good things are good scholars."[20]

As the Persian poet **Jalāl al-Dīn Rūmī** puts it:

بد گهر را علم و فن آموختن
دادنِ تیغ است دستِ راهزن
تیغ دادن در کف زنگیِ مست
به که باشد علم ناکس را بدست
علم و مال و منصب و جاه و قرآن
فتنه آرد در کفِ بد گوهران

پس غزا زین فرض شد بر مـؤمنان

تا سـتانند از کـف مـجنون سـنان

"To impart knowledge and arts to villains, is like giving a sword in the hands of a robber; putting a sword in the hand of a drunk, is a lesser evil than arming a villain with knowledge; wealth, knowledge and position are the cause of corruption in the hands of ignobles; therefore, it is incumbent on the believers, to snatch spears from the grip of lunatics."

The Holy Quran itself considers religious faith to be an essential factor for attaining all-round superiority.

«ولا تهنوا و لا تحزنوا و انتم الاعلون ان کنتم مؤمنین» (آل‌عمران/۱۳۹)

"Faint not, neither sorrow; you shall be the upper ones if you are believers." (3:139)

«و لو ان اهل القری آمنوا واتقوا لفتحنا علیهم برکات من السماء والارض...» (الاعراف/۹۶)

"Yet had the peoples of the cities believed and been God fearing, We would have showered upon them blessing from heaven and earth..." (7:96)

«... ولله العزة ولرسوله وللمؤمنین...»

(المنافقون /٨)

"Yet glory belongs unto God, and unto His Messenger and the believers..." (63:8)

It is to be noted that despite the importance given to learning science and technology, they are not considered to be sufficient in themselves; and Muslims should, in addition to raising their standard in the material and scientific fields, have firm belief in the Islamic ideology and follow the religious principles for attaining the desired goals. **Sayyid Qutb** elaborates this matter in a convincing manner:

"God has made a clear promise and has given a definite order that if real faith penetrates into the souls of the faithful and is exemlified in their life style and their system of government, and if in all their acts and discourses Muslims pay atterntion only to Allah..., then Allah will not grant unbelievers any syperiority over the believers. In order to guarantee our victory in every place and at all times, we should give prioity to our faith and its requirements... and it is faith itself that demands from us strength and self-sufficiency. It forbids us to rely on our enemies and to seek help from anybody but

Allah."[21]

b) Islam encourages Muslims to equip themselves with science and technology, to guarantee the independence and development of the Islamic society, for the sake of the preservation of spiritual aspects. Even in the Quranic verse:

«واعدوا لهم ما استطعتم من قوة و من رباط الخيل...» (الانفال/ ۶۰)

"And prepare against them what force you can and horses tied at the frontier to frighten thereby the enemy of Allah and your enemies." (8:60)

where God invites Muslims to strengthen their defence; it is immediately added that its aim is the weakening (frightening) of the enemies of God and Muslims. Therefore, while strenghthening their material powers, Muslims should employ them in the service of spiritual causes and for the realization of Islamic ideals. They should not seek material progress for its own sake. The following glorious verses propound this idea in clear terms:

«انّا جعلنا ما على الارض زينة لها لنبلوهم ايهم احسن عملا» (الكهف/۷)

"Surely We have made whatever is on the earth an embelishment for it, so that We may try

them (as to) which of them is best in works."
(18:7)

«و هو الذی خلق السموات والارض فی ستة ایّام و کان عرشه علی الماءلیبلوکم أیّکم احسن عملا...»
(هود /۷)

"And He is Who created the heavens and the earth in six periods and His dominion (extends) on the watersöthat He migh manifest you, which of you is best in action." (11:7)

Conclusion

We notice that in Islam, everything revolves around the axis of the unity of God, and that the desirability of science and technology is based on the fact that these are tools that add to our knowledge of God and are effective in the establishment of an independent monotheistic society. In our age, that the Islamic countries are under the influence of the unbeliers, Muslims have a great responsibility on their shoulders. Take into consideration a verse we quoted earlier:

"And prepare against them what force you can and horses tied at the frontier, to freithen thereby the enemy of Allah and your enemy..."
(8:60)

According to this Quranic injunction, Muslims should prepare and equip themselves in every respect, and since, today empirical sciences play a fundamental role in every aspect of the material life, strengthening of this dimension of Islamic policy is a necessity. The Islamic countries, therefore, should establish centers for promoting scientific and technological research and should train experts of high calibre in all useful fields of science and technology. In this attempt, however' they should put the emphasis on fundamental sciences, so that they shall be able to advance original research rather than imitate others.

On the other hand, in order to ensure the success of scientific renaissance in Islamic policy, several important points should be taken into consideration:

1- It is obvious that at the present time, Muslims need to learn science and technology from the countries that are advanced in these fields, and, of course, this is not by itself a blameworthy action. In fact our **Prophet Muhammad** (SA) is reported to have said:

«اطلبوا العلم ولو بالصين»

"Seek knowledge even if it be in China"[22]

«الحكمة ضالة المؤمن فحيث وجدها فهوا حق بها»

"The believer is always searching for wisdom; wherever he may find it, it is his, because he deserves to have it more than anyone else."[23]

«خذوا العلم من افواه الرجال»

"Acquire knowledge from what people say."[24]

And Imām `Alī (AS) is reported to have said:

«حق على العاقل ان يضيف الى رأيه رأى العقلاء و يضم الى علمه علوم الحكماء»

"It is praiseworthy for every wise man to add the opinions of other sages to that of his own, and add the learnes' knowledge to his own knowledge."[25]

«العلم ضالة المؤمن، فخذوه ولو من ايدى المشركين»

"Knowledge is the lost property of a believer; thus, acquire it even if it is in the polytheists' hands."[26]

The Muslim scholars of the past did the same and what we are supposed to do is to receive knowledge from non-believers in a selective manner, i.e. to purge it from the elements alien to Islam and to remodel it in the light of the Islamic world-view. It is under the guidance of these principles that Muslims can acquire knowledge from non-Muslim sources and mould it to suit the Islamic ideals. It is only under these conditions

that different levels of knowledge can be co-ordinated to attain our aim and can take us closer to God.

2- We should revive the scientific spirit of our learned ancestors and their zeal to reshape different branches of knowledge for making use of them for the development of Islamic civilization. They did not see any real contradiction between the so-called religious sciences and the physical sciences, and they considered the aim of both to be the same. In their view both the biological and physical sciences show the harmony between various parts of the universe, and therefore, they lead us to Godösomething which is the aim of religion too. It was due to this kind of outlook that religious as well as physical sciences were taught together and some of the Muslim scholars were first-rate authorities in both of them. This praiseworthy tradition has to be revived again, and the curricula of our universities have to include both religious sciences and the latest scientific and technological advances.

It is only in this way that Muslims can be equipped with the latest developments made in scientific fields and at the same time protect their students against atheistic and materialistic teachings of the East and

the West, and can bring science and technology under the guidance of Islamic outlook.

3- According to the Holy Quran man is the vicegerent of God on earth:

«و اذ قال ربك للملائكة انى جاعل فى الارض خليفة...» (البقرة/ ۳۰)

"And when your Lord said to the angels 'I am going to place in the earth a vicegerent'..." (2:30)

«هوالذى جعلكم خلائف الارض فمن كفر فعليه كفره...» (فاطر/ ۳۹)

"It is He Who appointed you vicegerents in the earth; so whoever disbelieves, his unbelief shall be charged against himself." (35:39)

«ثمّ جعلناكم خلائف فى‌الارض من‌بعدهم لينظر كيف تعلمون» (يونس/ ۱۴)

"Then We appointed you vicegerents in the earth after them, so that We may see how you act." (10:14)

Now, in order to be able to play this role, God has given man all kinds of gifts and has endowed him with intelligence, and has provided a nice harmony between the creation of man and the rest of the universe so that human beings can take care of their needs. Again

to quote the Holy Quran:

«هــــو الذى خــلق لكــم مــا فـــى الارض جــميعا» (البقرة/٢٩)

"He it is Who created for you all that is in the earth."(2:29)

«ولقــد مكــنا كــم فـى الارض و جـعلنا لكـم فـيها معايش...» (الاعراف/١٠)

"And certainly We have established you in the earth and made in it means of livelihood for you..." (7:10)

It is therefore for Muslims to employ their knowledge and technology for the solemn goals of Islam and higher interests of humanity in order to exemplify the glorious verse:

«كنتم خير امة اخرجت للناس تأمـرون بـالمعروف و تـــنهون عـــن المـــنكر و تـــؤمنون بـــالله...» (آل‌عمران/١١٠)

"You are the best nation ever brought forth to men, bidding to honour, and forbidding dishonour, and believing in God." (3:110)

Muslims are not permitted to destroy the earth or spread injustice and corruption upon the earth. They are asked to dwell in it in a manner desired by God:

«...هــو أنشأكــم مـن الارض واسـتعمركم فـيها...»

(هود/۶۱)

"He brought you forth from the earth and hath made you to dwell in it." (11:61)

They are supposed to reform it and bring order to it. Unfortunately Western science, due to its misconceived philosophical notions, has brought destruction in its wake and the knowledgeable and powerful scientists of our time fit the description in the following verse of the Holy Quran:

«و اذا تولی سعی فی الارض لیفسد فیها و یهلك الحرث و النسل والله لا یحب الفساد (البقرة/۲۰۵)

"And whenever he prevails, he hastens, about the earth, to do corruption there and to destroy the tillage and the stock: and God does not love corruption." (2:205)

The story of Adam, in the Quran, while illustrating the superiority of man, due to his being vicegerent of God and his knowledge of the "names" (*'asmā'*), warns us of the dangers that face him whenever he violates God's commandments. Man is appointed as the vicegerent of God on earth in order to reform it, to see the signs of God, and to become representative of His Power and Wisdom.

4- In the schools and universities of the Islamic

countries, sufficient attention should be paid to the problem of moral purification of students and they ought to be instructed in virtuous actions. It is only then that the graduates of schools and universities will be both faithful and knowledgeable, and it is with this kind of scientists that order can be brought to our world and the well-known saying of Imām **`Alī** (AS) exemplified:

«و بالایمان یعمر العلم».

"Knowledge prospers through faith."[27]

Knowledge without faith does does not produce anything better than what Western civilization has produced, and the faithless scientists have no aim but position, power, and wealth. Imām **Khomeini** has justly said:

> *"All of these tools that are made for the destruction of mankind and all of the advances that are made in the field of weaponry are the products of university graduates who have not been morally trained and who have not purified their souls."*[28]

The Holy Quran itself, when talking about the Prophet's message, mentions spiritual training to be compulsory for learning:

«كما ارسلنا فيكم رسولا منكم يتلوا عليكم آياتنا و يزكيكم و يعلمكم الكتاب و الحكمة...»
(البقرة/١٥١)

"As also we have sent among you, of yourselves, a Messenger, to recite Our signs to you and to purify you, and to teach you the Book and the Wisdom." (2:151)

«و يعلمهم الكتاب و الحكمة و يزكيهم...»
(البقرة/١٢٩)

"... and teach them with the Book and the wisdom... and purify them." (2:129)

«هو الذى بعث فى الاميين رسولا منهم يتلوا عليهم آياته و يزكيهم و يعلمهم الكتاب و الحكمة...»
(الجمعة/٢)

"It is He Who has raised up among the illiterates a Messenger among themselves, to recite His signs to them, and to purify them, and to teach them the Book and the Wisdom..." (62:2)

Muslim scholars, too, used to recommend to their students to have spiritual training, and in seeking knowledge not to go after position, power, or wealth.

In short, in order to secure the spiritual as well as the material welfare of an Islamic society, it is essential

to have learning tied with spiritual training.

5- The Holy Quran calls the followers of Islam a justly balanced nation:

«وكذلك جعلناكم امة وسطا لتكونوا شهداء على الناس...» (البقرة/١٤٣)

"Thus we have made of you a justly balanced nation that you might be witnesses over the nations..." (2:143)

And it recommends them to maintain equilibrium between the spiritual and the material dimensions of life:

«ربنا آتنا فى الدنيا حسنة و فى الآخرة حسنة...» (البقرة/٢٠١)

"Our Lord, grant us good in this world and good in the hereafter." (2:201)

«وابتغ فيما آتاك اللّه الدار الاخرة و لا تنسى نصيبك من الدنيا» (القصص/٧٧)

'And seek by means of what Allah has given you the future abode, and do not neglect your portion of this world." (28:77)

Therefore, Muslims should not, like Western people, become deeply involved in material aspects of life, and should not forget the spiritual dimensions of existence. Muslims should be aware of the fact that in

Islamic outlook all material opportunities are permissible but not as an end in themselves. They serve as a ladder for the spiritual progress of man.

Muslims should never forget that Islam is radically opposed to the materialistic approach in the acquisition of science and technology and stresses that they should not be sought for their own sake. This does not in any way delimit the scope of empirical knowledge. It only means that, in making progress in this area, they should always remember God and seek His proximity as a primary goal.

In short, today we face two realities: on the one hand we see that the West has progressed in various fields of science and technology tremendously, and on the other hand, this material progress has not brought satisfaction to the Western man. It has rather drawn him to the pitfall of nihilism, and in fact it has brought mankind to the verge of total annihilation. Under these circumstances, the duty of Muslims is to compensate for their lag in the fields of science and technology, and, by reviving Islamic teachings and the prevailing Islamic outlook, they can guide humanity toward real welfare and happiness.

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الاسلام يعلوا و لا يعلى عليه

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CHAPTER 3

SCIENCE AND ETHICS
IN
THE QURANIC OUTLOOK

I. Moral Dimension of Human Beings in the Quranic Outlook

In the Quranic outlook, science and ethics are parts of an underlying world-view which considers the phenomena of nature as signs of God, attributes a telos to the universe and assumes a moral character for the cosmos.

According to the Holy Quran, God endowed human beings with the capacity of understanding nature:

«و علّم آدم الاسماء کلّها ...» (البقره/۳۱)

"And He taught Adam all the names ... ." *(2:31)*

and made them His vicegerents in the earth:

«و هوالذي جعلكم خلائف الارض و رفع بعضكم

فوق بعض درجات ليبلوكم فى ما آتاكم انّ ربّك سريع العقاب ...» (الانعام/١۶٥)

"It is He Who has appointed you vicegerents in the earth, and has raised some of you in ranks above others, that He may try you in what He has given you, swift is your Lord in retribution ..." (6:165)

and granted them dignity:

«ولقد كرّمنا بنى آدم ...» (الاسراء/٧٠)

"And surely we have honored the children of Adam..." (17:70)

This was accompanied by three things:

(i) Ability to use natural resources

An important by-product of human beings' knowledge of natural phenomena is their acquisition of ability to take advantage of natural resources:

«الم تروا انّ اللّه سخّر لكم ما في السموات و ما في الارض و اسبغ عليكم نعمه ظاهرةً و باطنةً ...» (لقمان/٢٠)

"Do you not see that Allah has made what is in the heavens and what is in the earth subservient to you, and made complete to you his favors outwardly and inwardly? ..." (31:20)

(ii) Individual and social responsibility

In the Quranic view, human beings are responsible for their actions both at the individual and the societal levels

«فوربّك لنسئلنّهم اجمعين. عمّا كانوا يعلمون»
(الحجر/٩٣-٩٢)

"So, by our Lord, we would certainly question them all, as to what they did." (15:92-93)

This responsibility includes taking care of the earth's resources as well as our environment and avoiding any kind of mischief on the earth:

«و لاتفسدوا في الارض بعد اصلاحها وادعوه خوفاً و طمعاً انّ رحمة اللّه قريب من المحسنين»
(الاعراف/٥٦)

"And do not make any mischief in the earth after its reformation, and call on Him, fearing and hoping." (7:56)

To be more explicit, human responsibility has the following dimensions:

ü responsibility of the individual towards his or her own actions:

«هذا يوم الفصل الذي كنتم به تكذّبون ... وقفوهم انّهم مسئولون» (الصافات/٢٤-٢١)

"This is the day for sorting things out which you

have been denying... Stop them! They must be questioned" (37:21-24)

ü one's responsibility towards his or her society:

«يؤمنون بالله واليوم الاخـر و يأمـرون بـالمعروف و ينهون عن المنكر و يسارعون فى الخيرات و اولئك من الصالحين» (آل عمران/ ۱۱۴)

"They believe in God and the last day; they command decency and forbid dishonor, and compete in doing good deeds. Those are honorable people" (3:114)

and in the words of the **Prophet Muhammad** (SA):

«الا كلكم راعٍ و كلكم مسئول عن رعيته»

"Verily, each one of you is a guardian (shepherd) and each guardian (shepherd) is responsible for his subjects (flock)" [1]

ü responsibility towards other creatures:

«و ما من دابّة في الارض و لا طائر يطير بجناحيه الاّ امم امثالكم ما فرطنا في الكتاب مـن شـيى ثـمّ الى ربـهم يحشرون» (الانعام/۳۸)

"There is no animal crawling on the earth, nor a bird flying with its wings, but they are communities like you" (6:38)

It has been narrated from the **Prophet Muhammad** (SA):

«الخلق كلّهم عيال اللّه، فاحّبهم الى اللّه انفعهم لعياله»

"All creatures are God's family (dependents); and God loves the most those who are the most beneficent to His family (dependents)" [2]

and from Imām `Alī (AS):

«اتقو اللّه في عباده و بلاده، فآنكم مسئولون حتّي عن البقاع و البهائم»

"Fear God about His servants and His cities, because you will be questioned even about lands and beasts" [3].

(iii) Awareness of right and wrong

According to the Quran, God created human beings in balance and inspired to them the good and evil:

«الم نجعل له عينين و لساناً وشفتين و هديناه النجدين» (البلد/ ١٠-٨)

"Have we not given him two eyes; a tongue and two lips; and shown him the two highways (of the good and the evil)?" (90:8-10)

and

"و نفس و ما سوّيها. فالهمها فجورها و تقويها.» (الشمس /٨-٧)

"And by the soul and Him who shaped it and inspired it with (the knowledge) of the right and

wrong." (91:7-8)

II. Moral Dimension of Science and Technology

There are four concepts in the Quran and the Islamic tradition which are relevant to the moral dimension of science and technology. These are the ideas of ``useful knowledge", ``balance", ``purification of soul" and ``evading unsound judgments".

(i) Useful knowledge

As we mentioned in the first chapter, Islam recommends the acquisition of knowledge in its generic sense. But one is supposed to seek useful knowledge. In the **Prophet's** words:

«سلو الله علماً نافعاً و تعوّذوا بالله من علم لا ينفع»

``Ask God for useful knowledge, and seek refuge in God from that kind of knowledge which does not benefit"[4].

Here usefulness is not used in the utilitarian sense; rather, it is used in the sense of helping humankind to perform his God-assigned role in this world.

(ii) Balance in the cosmos and in all human actions

In the Quranic view , everything in the universe, is created orderly and in balance, and human beings are not supposed to disturb this balance:

«و الشمس والقمر بحسبان ... و السماء رفعها و وضع الميزان. الاّ تطغوا فی الميزان» (الرحمن /۸-۵)

"The sun and the moon pursue their ordered course ... He raised the Heaven and set the balance. That you might not transgress the balance." (55:5-8)

This means that the laws that rule over human affairs should be harmonious with the laws governing the cosmos, as they both refer to the same God and God wants to keep everything balanced in the cosmos.

A corollary of 'balance' is the concept of "moderation". Thus, the Qur'an recommends people to avoid consuming or acquiring beyond their real needs:

«و الذين اذاانفقوا لم يسرفوا و لم يقتروا و كان بين ذلك قواماً» (الفرقان /۶۷)

"And those [are servants of God] who when they spend, are neither wasteful nor niggardly, and there is a just mean between those [extremes]." (25:67)

This means that,e.g., the immoderate use of natural

resources is to be avoided.

(iii) Purification of soul

According to the Holy Qur'an , the message of all apostles of God was two-fold: to teach people the faith and to purify them:

> *``Our Lord! and raise up in them an apostle from among them who shall recite to them Your communications and teach them Book and the wisdom, and purify them ..." (2:129)*

This means that the acquisition of knowledge has to be supplemented by the acquisition of moral values. Then the education will give direction to one's life and gives the individual a sense of responsibility. The **Prophet Muhammad** (SA), himself, mentioned that his main task had been the completion of high moral standards:

«انّما بعثت لاتمّم مكارم الاخلاق»

> *``Verily, I was sent out to complete high moral standards."*[5]

The Qur'an recommends doing deeds that improve the well-being of an individual or a society. For example:

«و سارعوا الى مغفرة من ربّكم و جنّة عرضها السموات

و الارض اعدّت للمتقين. الذين ينفقون فى السـرّاء و
الضرّاء و الكاظمين الغيظ و العافين عن الناس و اللّـه
يحبّ المحسنين» (آل عمران/ ۱۳۴-۱۳۳)

"And vie with one another to attain your Sustainer's forgiveness and a Paradise as vast as the heavens and the earth, which awaits the God conscious, who spend for charity in time of plenty and in time of hardship, and restrain their anger and pardon their fellow men, for God loves those who do good." (3:133-134)

(iv) Avoiding unsound judgments

As we mentioned in the last chapter, the Holy Quran has emphasis on avoiding unsound confirmations and rejections:

«و لا تقف ما ليس لك به علم، انّ السمع و البصر و
الفؤاد كلّ اولئك عنه كان مسئولاً» (الاسراء/۳۶)

"And follow not that of which you have not knowledge; surely the hearing and the sight and the heart, all of this shall be questioned about that." (17:36)

III. Science and Ethics in the Contemporary World

Before modern era, ethical considerations were a concern of all faithful scientists, both in the Islamic world and in the Western world. This perspective has been dramatically changed in our era and has led to grave consequences. There has been environmental pollution, excessive depletion of earth's natural resources, and the production of the worst possible kinds of mass destruction. We believe that the whole problem has developed from a change in attitude toward science that took place after the Renaissance. The progress of science has been effective in marginalizing ethical considerations and spreading around the subjectivism of moral values. This is rooted in the prevalence of a belief among scientists that facts and values are separated. They argue that science is an objective value-fee enterprise dealing with facts, where as values are subjective, depending on personal opinion.

In the Qur'anic outlook, ethics is related to the world's telos, and the appropriateness of any human activity is measured by the degree of its harmony with that goal. The real ground for moral conduct is the

belief in a universe which has an underlying purpose and moral order.

While we admit that on the logical basis alone one cannot derive normative statements from factual statements, we believe that science and ethics are related both at the metaphysical level and at the practical level. In the Quranic outlook, the study of nature and the respect for moral values both fit within the Qur'anic worldview which coordinates all aspects of human experience. Furthermore, Science is a goal-directed enterprise. Thus, it must include some kinds of values that give direction to its goals, its conduct and its applications. Value-judgements enter into decision making concerning the applications of science and technology, and scientific discoveries and technological innovations often lead to important social, moral and political consequences. Thus, as a member of a society, a scientist should not ignore the consequences of his or her research or teaching.

The destructive consequences of modern science and technology has been due to the separation of facts from values and the indifference of some scientists towards the ethical and social consequences of their scientific findings or technological innovations.

To humanize applied science and technology, one needs to take into account ethical considerations, especially when one is dealing with the kind of research that affects humankind or the environment. This can be done by embedding the scientific investigation of nature within a richer framework which includes other dimensions of human experience, including spiritual and moral ones ö a worldview that relates man's life to the rest of the universe. This brings us back to the Quranic instruction that one's scientific training should be accompanied by soul purification. This is supposed to prevent scientists from conducting any kind of research which could be harmful to the human life, other creatures and our environment.

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CHAPTER 4

THE SCIENTIFIC DIMENSION OF THE QURAN

Views Concerning ``Scientific Verses"

In more than ten per cent of the Quranic verses, we see references to natural phenomena. A subiect of fundamental importance is to discover the kind of message that the so-called *scientific verses* have for us, and how we can benefit from them. There two views about this matter.

One view says that the Holy Quran includes all kinds of knowledge and therefore it contains the basic ingredients of all fields of scientific knowledgs. The second holds that the Quran is merely a book of guidence, and there is no room for the physical and natural sciences in it. We shall, first, explain these two views in some detail and then try to spell out our own view.

1. The Quran as a source of scientific knowledge

In our times we see many people who try to interpret some of the Quranic verses in the light of our present scientific knowledge. The main purpose of these people is to show the miracle of the Quran in the scientific domain and to convince non-Muslims of the glory and uniqueness of the Quran, and to make fellow Muslims feel proud of having such a great scripture.

But the view of considering the Quran as a source of all knowledge is not a new one, and we see many great Muslim scholars of the past who were proponents of this view. One is **al-Ghazzālī**. In his book `Ihya-o *`Ulum al-Din* (The Revival of Religious Sciences), he quotes **Ibn Mas`ūd** as saying:

> *"If one desires to have the knowledge of the sciences of the ancients and the moderens, he should ponder over the Quran."*

al-Ghazzālī further adds:

> *"In short, all sciences are included in the works and attributes of Allah, and the Quran is the explanation of His essence, attributes, and works. There is no limit to these sciences, and in the Quran there is an indication of their*

confluence".[1]

And in his other book *Jawāhir al-Quran* (The Jewels of the Quran), which was written after the `Ihyā' he has more to say about this matter. In the chapter on ``The Stemming of the Sciences of the Ancients and the Moderns from the Quran", he says:

> *``The principles of these sciences, which we have enumerated and of those which we have not specified, are not outside the Quran, for all of these sciences are drawn from one of the seas of the knowledge of Godömay He be exaltedöi.e.,the sea of His works. We have alerady mentioned that the Quran is [like] a sea which has no shore, and that `if the ocean became ink for [transcribing] the words of my Lord, surely the ocean would be exhausted before the words of my Lord came to an end.' Among the works of Godömay He be exaltedöwhich [for their vastness can be called] the sea of His works are, for instance, recovery and disease, as Heömay He be exalted ö narrating the words of Abraham, said, `When I fall ill it is He who restores me to health'... This single work can only be known by him who*

knows the science of medicine completely, for this science means nothing but the knowledge of all aspects of disease together with their symptoms, and knowledge of their cure and its means. Among the works of God are [also] the determination of [man's] knowledge of the sun and the moon and of their stages according to a fixed reckoning, as Godömay He be exaltedösaid `The sun and the moon move according to a fixed reckoning'
`He ordeained stages for the moon so that you might learn the method of calculating years and determining time...' The real meaning of the movements of the sun and the moon according to a fixed reckoning and of the eclipses of both, of the merging of the night into day and the manner of wrapping of one of them around the other, can only be known by him who knows the manner of the composition of the hevavens and the earth, and this itself is a science (i.e., astronomy)... should we go on narrating the details of Divine works to which the verses of the Quran point, it would take a long time. Only an indication of their confluensce is

possible [here], and we have done this where we have mentioned that knowledge of Divine works is among the sum total of knowledge of Godömay He be exalted. That sum total includes these details. Likewise, every division we have briefly described, will, if further divided, branch off into many details.

Reflect, then, on the Quran and seek its wonderful meanings, so that perchance you may encounter in it the confluence of the sciences of the ancients and the moderns and sum total of their beginnings. Reflection on the Quran is intended only for reaching from the brief description of these sciences to their detailed knowledge and it is [like] an ocean that has no shore."[2]

al-Suyūtī (d. 911 H. /1505) too, has the same view. In his book *al-`Itqān fī `Ulūm al-Quran*, he tries to argue that the Quran contains all sciences. Using verses like:

...مافرّطنا فى الكتاب من شيٍء... (الانعام/٣٨)

``...We have not neglected anything in the Book..." (6:38)

...ونزّ لناعليك الكتاب تبياناً لكل شيٍء... (النحل/٨٩)

"...And we have revealed the Book to you explaining clearly everything."(16:89)

and also prophetic traditions such as:

"The Prophet said, 'There shall be evils'. He was asked, 'What can save us from them?' He answered, 'Allah's Book; there is in it the news of what happened before you and the news of what shall happen after you'..."

he argues that the Quran contains the sciences of the ancients and of the moderns. Furthemore, he adds:

"Allah's Book contains everything. There is no basic section or problem of any science for which there is no indication in the Quran. In the Quran, one finds the wonderous aspects of the creatures, the spiritual dimension of the heavens and the earth , what is in the horizon's loftiest part and what is beneath the sod, the beginning of the creation..."[3]

We find this kind of outlook in Muslim scholars of recent times too. For example, **'Abd al-Rahmān al-Kawākibī** (d. 1902), in his book, *Tabā'i-al-'Istibdād* (The Nature of Depotism) says:

"In recent centuries, science has revealed many facts and these are attributed to their

discoverers who are European or American. But those who examine the Quran carefully, find that most of those facts were stated, explicitlyor implicitly, in the Quran thirteen centuries ago; and these were not left hidden but to show, upon their discovery, a miracle of the Quran, and to indicate that it is the word of the Lord who is the only one aware of the hidden."[4]

And among the recent proponents of this view is **Mustafā Sādiq al-Rāfi'ī**. In the Quran, he said, one finds many hints for the scientific facts; and modern science helps us to interpret the meanings of some of the Quranic verses and to discover their facts.[5] Also Shaykh **Muhammad Bakhīt** says:

"Thus, it [the Quran], with its phrases and hints, is indicative of the true nature of all things and their characteristics and affairs and their qualitative and qualitative changes; and it contains all sciences which deal with the true nature of the creatures in all worlds..."[6]

At this point it is necessary to mention that the early muslim scholars' motive in considering the Quran the source of all sciences arose out of their conviction in the comprehrnsiveness of the Quran, but the recent

scholars, while believing in this, have more emphasis on proving the miraculous state of the Quran in the scientific domain. Therefore, they try to adapt the Quran to the findings of contemporary science.

Some of these scholars believe that there is nothing in the new findings of science which was not predicted by the Quran. For example, **al-Tanta̅wi̅**, in his commentary on the Quran, tries to extract the results of the physical and natural sciences from the Quran, and is afraid that he might not live long enough to locate all of the findings of science and technology in the Quran. Yet, he is happy that the discoveries of science up to now are indicative of the prophetic power of the Quran.[7] He even tries to reconcile unestablished theories of science with the Quran.

In our time we find a tremendous increase in this kind of activity, and some Muslim scholars want to extract all the findings of contemporary science from the Quran, and thereby prove the miraculous nature of the Quran and its fitness for survival. For instance, **Abd al-Razza̅q Nawfal**, in his book *The Quran and Modern Science*, says:

> *"Thus, when we prove to non-Arabs that the Quran contains the principles of modern science*

and it has already spoken of everynew scientific phenomenon. Is this kind of mirale of the Quran not enough to attract their attention to the Quran... Isn't the scientific miracle of the Quran the way to attract non-Arabs to Islam...? The day that we accomplish the translation, into various languages, of what the Quran has predicted and the development of various scienes has confirmed, our mission would be over and our call would be communicated, and the miraculous nature of the Quran would be clear to non-Arabs."[8]

And **Maurice Bucaille** says:

"The Quran follows on from the two revelations that preceded it and is not only free from contradictions in its narrations, the sign of various human manipulations to be found in the Gospels, but provides a quality all of its own for those who examine it objectivelyand in the light of science, i.e., its complete agreement with modern scientific data. What is more, statements are to be found in it (as has been shown) that are connected with science: and yet it is unthinkable that a man of Muhammad's

time could have been the author of them. Modern scientific knowledge therefore allows us to understand certain verses of the Quran which, until now, it has been impossible to interpret.'[9]

Some authors have tried very hard to extract every important idea of contemporary science from the Quran, and in this effort they have outstretched the normal usage of the Arabic language. For example, some people claim that the idea of atom and sub-atomic particles is mentioned in the Quran. To prove this, they resort to the following verses[10]:

...ومايعزب عن ربّك من مثقال ذرّةٍ فی الارض ولا فی السّماء ولا اصغر من ذلك ولااكبر الاّ فی كتابٍ مبينٍ (يونس/٦١)

"...There does not lie concealed from your Lord the weight of a small particle in the earth or in the heaven, nor any thing less than that nor greater, but it is in a clear Book."(10:61)

...لا يعزب عنه مثقال ذرّةٍ فی السماوات ولافی الارض ولا اصغر من ذلك ولااكبر الاّ فی كتابٍ مبينٍ (سباء/٣)

"...Not the weight of a (small) particle is absent from Him in the heavens or in the earth, and neither less than that nor greater, but (all) is in

a clear Book." (34:3)

Here, they identify the Arabic word ``*dharrah*" with atom, whereas the customary meaning of it is ``small ant" or ``a small dust particle", [11] and there is no convincing reason to believe that Allah has used a terminology that our prophet's contemporaries could not understand.

The efforts to reconcile a sacred scripture with contemporary science are not restricted to Muslims. Christians, too, try to extract moden science from the Bible, and Jews have done the same thing with the Old Testament. They, too, consider this to be a sign of the validity of their scriptures.

2. The Quran as a book of guidance

The aforementioned outlook towards the scientific dimension of the Quran has been under fire even from the old times. **Abū Ishāq al-Shātibī** (b.790 H. /1388), one of the early opponents of this view, argues that our virtuous predecessors were more knowledgeable about the Quran than we are, and they did not talk about these kind of sciences, and this is an indication that they did not consider the Quran to contain such matters [12]. **al-Shātibī** relates the Quranic

verse:

...مافرّطنا فی الکتاب من شيء... (الانعام/۳۸)

...We have not neglected any thing in the Book...(6:38)

to the accountable duties and of worship, and identifies the word ``Book'' in this verse with the ``Guarded Tablet'' (mentioned in the verse 85:22).

The aforementioned view has been criticized by some well-known scholars of recent times, too. Their argument can be summarized as follows:

1. It is not right to interpret the Quranic words in a way that was not known to the Arabs of the Prophet's era.

2. The Quran was not revealed to teach us science and technology; rather, it is a book of guidance. Therefore it is beyond its aim to talk about natural and physical sciences. The meaning of the aforementioned verses (i.e., 6:35 and 16:82) is that the Quran cotains whatever is needed for our guidance and felicity (in this world and in the Hereafter).

3. Science has not reached its ultimate stage of progress. Therefore, it is not right to interpret the Quran in accordance with changeable theories. A theory becomes very popular during a period, and then

it is replaced by another one. The Ptolemaic system was popular for a long time and then it was discarded. It is wrong to assume that the Holy Quran supports contradictory theories. Prominent Muslim scientists of the past, like *Avicenna, al-Bīrūnī, al-Tūsī, Ibn al-Haytham,* ... too, did not seek scientific formulas in the Quran, though they had a true conviction in it and were very knowledgeable about it. Besides, if we could find the trace of all scientific theories and formulas in the Quran, what we would have is no more than a scientific encyclopaedia like other available encyclopaedias. The adaptation of the Holy Quran to unstable theories of science has this danger, too, that it threatens the stabiliy of the Quranic facts and opens the door for unacceptable interpretations.

4. It is Allah's will that human beings discover the secrets of nature through the use of their senses and intellect. If the Holy Quran contained all of the sciences of nature, human intellect would remain idle and human freedom would be meaningless. As Shaykh **Muhammad Abduh** has said:

> *"If it were upon the Prophet to explain the natural and astronomical sciences, that would be the end of the activity of human senses and*

inthellect, and that would spoil human freedom... Yes, the Prophet advised people briefly to use their senses and intellect on whatever improves their welfare, broadens their knowledge, and in the end advances their souls... Therefore, the doors for these sciences are intellect and experimentation not tradition and religious sciences."[13]

3. Our view

We believe that the Holy Quran is a book of guidance for human development, and it contains whatever human beings need in the domains of faith and action. We do not consider it a scientific encyclopaedia, neither we believe that it is right to adapt the Holy Quran to changeable scientific theories. On the other hand, one cannot deny that the Quran contains references to some natural phenomena. But these are not for the sake of teaching science; rather, they are used as an aid in attracting people's attention to Allah's glory and, thereby, bringing them closer to Him.

We also believe that the advancement of science makes it easier to undersdtand certain Quranic

passages. For example, the verse:

اولم يرالّذين كفروا انّ السماوات والارض كانتا رتقاً
فـفتقنا هـما و جـعلنا مـن المـاء كـلّ شـيٍء حـيّ...
(الانبياء/٣٠)

"Do not those who disbelieve see that the heavens and the earth were closed up, but We have opened them? And we have of water every thing living." (21:30)

refers to the evolution of the solar system and the role of water in life, and the verse:

و مـن كـلّ شـيٍء خـلقنا زوجـين لعلّكم تـذكّرونَ
(الذاريات/٤٩)

"And of everything we have created pairs that you might be mindful."(51:49)

informs us of the polarity evident in all creation. Modern science makes it much easier to underatand this kind of verses. In short, our view about the scientific interpretation of the Quran is the same as that of **Shaykh Mustafā al-Marāghi**, the late rector of al-Azhar University, as expressed in his introduction to **Ismā'il Pashā**'s *Islam and Modern Medicine:*

"It is not my intention to say that this Holy Book contains, in detail or summary, all of the sciences in the style of textbooks; rather I want

> *to say that it contains general principles by the help of which one can derive all that is needed to know for the physical and spirital development of human beings.*
> *It is in fact the duty of the scientists involved with various sciences to explain for people details that are known up to their time...*
> *It is essential not to extend [the meaning of] a verse to such an extent that it would enable us to interpret it in the light of science. Neither one should stretch [the interpretation of] scientific facts so that one could adapt it to a Quranic verse. However, if the apparent meaning of a verse is consistent with an estabished scientific fact, we interpret this verse with the help of that fact".*[14]

If we adapt the Quran to philosophical schools or sciences of a period, we reach the point where, in a perod of the dominance of positivism, we find a Muslim scholar trying to extract this philosophy from the Quran, considering it to be the basis of the Quranic wisdom[15], and disregarding the fact that this outlook leaves no room for meta-physics or any transcendental being.

Yet we would say that although the Quran is not a scientific encyclopaedia, there is an important message in the verses involving natural phenomena, and Muslim scientists should focus their attention on that message rather than contenting themselves with the miraclous aspects of the Quran in the scientific domain or its consistency with contemporary science.

Quranic Message for Muslim Scientists

As it is Well-known, there are mone than 750 Quranic verses dealing with natural phenomena. We think that these verses involve an important message for Mulim scientists. In our view, the following are the essential points of that message:

a) In these veses, the study of all aspects of nature and the discovery of the mysteries of creation is recommended:

و فی خلقکم و ما یبث من دابّةٍ ایاتٌ لقومٍ یوقنون

(الجاثیه/۴)

"And in your creation and in what He spreads abroad of animals, there are signs for a people that are sure."(45:4)

قل انظروا ماذا فی السماوات والارض...

(یونس/۱۰۱)

"Say, consider what is it that is in the heavens and the earth."(10:101)

قـل سيروا فـى الارض فـانظروا كـيف بـدا الخـلق...
(العنكبوت/٢٠)

"Say, travel on the earth and see how He made the first creation." (29:20)

According to the Holy Quran, We have to use our senses and intellect for the understanding of nature, and this shall lead us to appreciate the glory and majesty of Allah. As Allāmah **Tabātabāʼī** puts it:

"The Quran, in many of its verses, whihc on accomunt of their great number, will not be quoted here, invites reflection about heavenly signs, the brilliant stars and the extraordinary differences in their conditions and the systematic order which governs them. It encourages meditation concerning the creation of the earth, seas, mountains, deserts, wonderful things in the interior of the earth, the changes of day and night and seassons. It recommends thinking about the wonderful creation of plants, the order governing them, the creation of animals and the conditions of their environment. It calls of reflection concerning the creation of the

human being and the mysteries and secrets inherent in its structure, and above all, in its slef, internal world and its relationship with the exalted heaven. It insists upon a journey to all parts of the earth, on the observation of the vestiges of those gone by and the inquiry about the conditions of nations, human societies and their histhory.

Thus it invites to a study of natural and mathematical sciences, philosophy, literature and all the branches of knowledge accessible to humanity, the learning of which is in the interest of humanity and brings happiness to human society.

The Quran invites to these branches of knowledge on condition that people are guided by this knowledge to truth and know the real world which is headed by Godliness. Otherwise a knowledge that serves as an amusement and hinders one from knowing God and truth is the equivalent of ignorance in the vocabulary of the Quran."[16]

When the Holy Quran recommends that we look around the earth to find out the origin of creation, this

means that we have to obtain scientific facts through our efforts. It is against the spirit of the Quran that Muslims should remain idle while others get access to some of the mysteries of nature, and then they use their results and depend on them.

According to the Holy Quran, we can get access to cognition of nature if we use our senses and intellect. In fact the main reason that our great scholars, in the glorious period of Islamic civlization, paid attention to foreign (especially Greek) sciences was due to the Quran's emphasis on the study of nature. They studied nature to discover the mysteries of creation and to become aware of Allah's wisdom and power. **al-Bīrūnī** has explicitly stated[17] that the motive behind his research in the scientific fields is Allah's Words in the Quran:

...ويتفكّرون في خلق السماوات والارض ربّنا ماخلقت هذا باطلاً...(آل‌عمران/١٩١)

...And reflect on the creation of the heavens and the earth: our Lord! You have not created this in vain...(3:191)

which persuades human beings to ponder about the creation of the heaven and the earth ö a creation which is purposeful and not in vain.

The study of the so-called scientific verses in the Quran should motivate Muslims to go after natural and physical sciences, and not remain content with the hints given there.

b) The aftorementioned verses state that everything in this world is orderly and purposeful, and there is no fault in the works of Allah:

...وخلق كلّ شيء فقدّره تقديراً (الفرقان/٢)

"...And He created everything, then He ordained it very exactly".(25:2)

وما خلقنا السّماء والارض وما بينهما لاعبين (الانبياء/١٦)

"And We did not create the heaven and the earth and what is between them for sport."(21:16)

...ماترى في خلق الرّحمن من تفاوتٍ فارجع البصر هل ترى من فطورٍ* ثمّ ارجع البصر كرّتين ينقلب اليك البصر خاسئاً وهو حسير (الملك/٣-٤)

"...You see no imperfection in the creation of the beneficent God. Then look again, can you see any disorder? Then return back the eye again and again, your look shall come back to you dazzled, aweary." (67:3-4)

c) The Quran invites us to recognize the laws of

nature (i.e., Allah's patterns in the universe) and to exploit them for the welfare of human beings and without transgressing the limits of the Islamic laws:

الشّمس والقمربحسبانٍ*...* والسّـماء رفـعها ووضـع
الميزان* الاّ تطغوا فى الميزان (الرحمن /۵ـ۸)

"The sun and the moon follow reckoning... And the heaven. He raised it high and set the balance. Transgress not the balance."(55:5-8)

Of course, the exploitation of material means should lead to the spiritual development of human beings and not to their decay.

d) In the Quranic outlook, all sciences are different manifestations of a world which is created and governed by one God. Therefore their combination should lead to a single picture of the world.

e) Lastly, one of the most important things that we learn from the Quran, in relation to science, is its unique world-view and epistemology. Most of the evil resulting from the growth of science has its origin in the materiatistic outlook accompanying modern science. The Quran warns us against these pitfalls and informs us of the impediments to correct cognition of nature. It teaches us what tools to use for the cognition of nature and what prevents us from using

those tools properly.

In short, we believe that the most important lessons we learn from the so-called scientific verses of the Quran are:

1. Priority should be given to the discovery of nature by using human senses and intellect.

2. The Holy Quran can give us the correct world-view and epistemology.

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CHAPTER 5

PHILOSOPHY OF SCIENCE: A QURANIC APPROACH

I. The Aim of Understanding Nature

Nature means the physical world, that is, the world with which we come into contact through our senses. In the Holy Quran, there are more than 750 verses in reference to natural phenomena. In most of these verses, the study of the book of creation and the meditation upon its contents has been recommended. As confirmed by many outstanding Islamic scholars, the Quran is not a book of natural science, but rather one of guidance and enlightenment. The Quranic reference to the natural phenomena is meant to call man's attention to the might and glory of the Wise Creator of the universe through quest and meditation upon natural beings and to encourge him to strive to be in close proximity to Him.

From the Quranic viewpoint, natural phenomena are signs of the Almighty, and through the understanding of signs we attain cognition of the Lord of signs:

«ومن آياته ان خلق لكم من انفسكم ازواجاً لتسكنوا اليها و جعل بينكم مودّة و رحمة، انّ فی ذلك لآيات لقوم يتفكرون» (الروم/۲۱)

``And one of the signs is that He created mates for you from yourselves that you may find rest in them, and He put between you love and compassion, most surely there are signs in this for a people who reflect."(30:21)

«ومن آياته يريكم البرق خوفاً وطمعاً و ينزل من السماء ماء فيحی به الارض بعد موتها انّ فی ذلك لآيات لقوم يعقلون» (الروم/۲۴)

``And one of His signs is that He shows you the lighteningfor fear and for hope and sends down water form the cloudr, then gives life therewith to the earth after its death; most surely there are signs in this for a people who understand."(30:24)

«ومن آياته خلق السماوات والارض و اختلاف السنتكم و الوانكم، إنّ فی ذلك لآبات للعالمين» (الروم/۲۲)

"And one of His signs is the creation of the heavens and the earth and the diversity of your tongues and colour; most surely there are signs in this for the learned."(30:22)

From the Quranic viewpoint, the cognition of nature is not a fruitful undertaking except when it helps us to understand the Wise Creator of this world and to attain close proximity to Him. Understanding nature can promote man's insight towards the cognition of Allah and enables him to better utillize the gifts of Allah for his own eternal felicity and well-being.

II. The Possibility of Understanding Nature

In the Quran, there are many verses inviting man to study nature:

«وقل انظروا ماذا في السماوات والارض...» (يونس/١٠١)

"Say: Consider what is it that is in the heavens and the earth..."(10:101)

«وفي الارض آيات للموقنين وفي انفسكم افلا تبصرون» (الذريات/٢٠-٢١)

"And in the earth there are signs for those who are sure; And in your own souls (too); will you

not then see?"(51:20-21)

«قل سيروا فى الارض فانظروا كيف بدأالخلق...»
(العنكبوت/٢٠)

``Say: Travel on the earth and see how He made the first cration."(29:20)

«فلينظر الانسان ممّ خلق...» (الطارق/٥)

``So let man consider of what he is created."(86:5)

These verses show that understanding nature is possible, otherwise God would have not recommended its study.

From the following verses, too, we realize that man has been endowed with the talent of cognition, and he has to exploit this- faculty to the best of his ability:

«وعلّم آدم الاسماء كلّها...» (البقره/٣١)

``And He taught Adam all the names."(2:31)

«علّم الانسان مالم يعلم» (العلق/٥)

``Taught man what (he) knew not."(96:5)

«والله اخرجكم من بطون امّهاتكم لاتعلمون شيئاً وجعل لكم السمع و الابصار والافئدة لعلّكم تشكرون» (النحل/٧٨)

``And Allah has brought you from the wombs of your mothersöyou did not know anythingöand He gave you the hearing and the sight and the

hearts that you give thanks." (16:78)

Moreover, the Quran promises that the world is comprehensible:

«سنريهم آياتنا فى الآفاق و فى انفسهم حتّى يتبيّن لهم انّه الحق...» (فصلت/۵۳)

"We will soon show them Our signs in the universe and in their own souls, so that it becomes clear unto them that He is indeed the truth."(41:53)

«وقل الحمدلله سيريكم آياته فتعرفونها و ماربك بغافل عمّا تعملون» (النمل/۹۳)

"And say: praise be to Allah, He will show you His signs so that you shall recognise them; nor is your Lord heedless of what you do."(27:93)

These verses indincate that human beings will eventually come to have a better understanding of the truth about the universe.

III. The Main Issues In Understanding Nature

Although from the viewpoint of the Quran, the ultimeate goal in understanding nature is to comprehend and approach God, yet there are certain subsidiary goals, the apprehension of which may be

considered as preliminary steps towards that ultimate goal.

There are certain issues involving natural phenomena, which are pointed out in the Holy Quran. Here, we classify them into three groups:

1- Origin and evolution of beings and phenomena

There are verses that indicate that we should attempt to discover the origin and evolution of beings, as this will help in enhancing man's faith and expediting thing proximity to God.

«اولم يرالذين كفروا انّ السماوات و الارض كانتا رتقاً ففتقناهم وجعلنا من الماء كل شيء حيّ...» (الانبياء/۳۰)

"Do those who disbelieve not see that the heavens and the earth were closed up, but We have opened them, and have made of water everything living..."(21:30)

«الم تروا كيف خلق الله سبع سماوات طباقاً* وجعل القمر فيهن نوراً وجعل الشمس سراجاً» (نوح/۱۵-۱۶)

"Do you not see how God has created the seven heavens one above another, and made the moon therein a light, and made the sun a lamp?"(71:15ö16)

«الـذی احسـن کـل شـیء خلقه و بدا خلق الانسان من طین* ثـم جعل نسله من سلالة من ماء مهین* ثم سویه و نفخ فیه من روحـه و جـعل لکـم السـمع و الابـصار والافئدة قلیلاً ماتشکرون» (السجده/۷-۹)

``Who made good everything that He has created, and He began the creation of man from dust. Then He made his progeny of an extract of water held in light estimation. Then He made him complete and breathed into him of His spirit and made for you the earth, and the air and the hearts. Little is it that you give thanks."(32:7-9)

«افلاینظرون الی الابـل کـیف خـلقت* والی السـماء کیف رفعت* والی الجبال کیف نصبت* والی الارض کیف سطحت» (الغاشیه/ ۱۷-۲۰)

``Will they not then consider the camel, how they are created and the heaven, how it is reared aloft, and the mountains, how they are firmly fixed, and the earth, how it is made a vast expanse?"(88:17ö20)

In some verses of the Quran, certain natural phenomena are mentioned as indications of the Resurrection:

«اولیس الذی خلق السماوات والارض بـقادرعلی ان

يخلق مثلهم بلى و هوالخلاق العليم» (يس/٨١)

"Is not He Who created the heavens and the earth, able to create the like of them? Yes! And He is the Creator (of All), the Knower."(36:81)

«واللّـه الذی ارسـل الریـاح فـتثیرسحابا فسـقناه الی بلدمیّت فاحیینا به الارض بعد موتهاکـذلك النشـور» (فاطر/٩)

"And God is He Who sends the winds so they rise a cloud, then we drive it on to a dead country, and therewith we give life to the earth after its death, even so is the uprising." (35:9)

«یا ایّها الناس ان کنتم فی ریب من البعث فانّا خلقناکم من تراب ثم من نطفه ثـم مـن عـلقة... وتـری الارض هامدة فاذا انزلنا علیهاالماء اهتزت و ربت و انبتت من کل زوج بهیج» (الحج/٥)

"O People! if you are in doubt about the Resurrection, then surely We created you from dust, then from a small life-germ, then from a clot, then from a lump of flesh, complete in make and incomplete... and you see the earth's sterile land, but when We send down on it the water, it stirs and swells and brings forth of every kind a beautiful herbage."(22:5)

2- The discovery of order, co-ordination and purpose in nature

Many of the verses in the Quran mention the existence of order, co-ordination, and purpose in nature as evidences confirming the existence of the Wise, Omniscient Creator. These verses can be classified into sevral groups:

a) Some verses specify that the creation of the heavens and the earth was not in vain, but had indeed some purpose behind it. For example:

«وهـو الذی خـلق السـماوات و الارض بـالحق...»

(الانعام/۷۳)

``And He it is Who has created heavens and the earth in truth..."(6:73)

«ومـا خلقنا السـماء والارض ومـا بينهما لاعـبين»

(الانبياء/۱۶)

`And We did not create the heaven and the earth and what is between them for sport."(21:16)

«افحسبتم انّما خلقناكم عبثاً وانكم الينا لاترجعون»

(المؤمنون/۱۱۵)

``What! Did you then think that We had created you in vain and that you shall not be returned to Us?"(23:115)

b) It is mentioned in some verses that events follow a natural course for a certain pre-determined period:

«اولم يتفكروا فى انفسهم ماخلق اللّه السماوات والارض و مابينهما الاّ بالحق واجل مسمّى وانكثيراً من الناس بلقاء ربهم لكافرون» (الروم/٨)

"Do they not reflect within themselves: Allah did not create the heaven and the earth and what is between them but in truth, and (for) an appointed term? And most surely most of the people are deniers of the meeting of their Lord."(30:8)

«اللّه الذى رفع السماوات بغير عمد ترونها ثم استوى على العرش و سخرالشمس و القمر كل يجرى لاجل مسمّى يدبّر الامر يفصّل الآيات لعلكم بلقاء ربكم توقنون» (الرعد/٢)

"Allah, He who raised the heaves without any pillars that you see, and He is firm in power, and He made the sun and the moon subservient (to you); each one pursues its course to an appointed time; He regulates the affair, making clear the signs that you may be certain of meeting your Lord."(13:2)

c) Some verses tell us that the whole process of creation and the course of events in nature follow a

proper reckoning and measure (that is, for everything there is a definite size and measuer):

«والشمس والقمر بحسبان»(الرحمن/٥)

``The sun and moon follow a reckonig."(55:5)

«وان من شيءالاعندناخزائنه ومانُنزّله الابقدر معلوم» (الحجر/٢١)

``And there is not a thing but with Us are the treasures of it, and We do not send it down but in a known meaure."(15:21)

«وكل شيء عنده بمقدار» (الرعد/٨)

``And there is a measure with Him of everyhing."(13:8)

«وخلق كل شيء فقدّره تقديراً» (الفرقان/٢)

``...He created everything then ordained for it a measure."(25:2)

«والسماء رفعها و وضع الميزان» (الرحمن/٧)

``And the heaven, He raised it high and He made the balance."(55:7)

«وأنبتنا فيها من كل شيء موزون» (الحجر/١٩)

``...And caused to grow in it of every suitable thing."(15:19)

It is precisely for the very existence of this order that laws of nature become significant. The scholars of natural science would not have so ardently pursued

the discovery of these laws had they not been subconsciouly aware of this very natural order.

From the above-mentioned verses and those ensuing, one can conclude that the discovery of order and coordination in nature (i.e. the laws of nature) and the certitude of God's handiwork is of great significance in understanding nature:

«هوالذی جعل الشمس ضیاءوالقمرنوراً و قدره منازل لتعلموا عدد السنین و الحساب ماخلق الله ذلك الاّ یات لقوم یعلمون» (یونس/۵)

``He it is who made the sun a shining brightness and the moon a light, and ordained for it mansions that you might know the computation of years and reckoning. God did not create it but in truth; He makes the signs manifest for people who know.''(10:5)

«...ماتری فی خلق الرحمن من تفاوت فارجع البصر هل تری من فطور» (الملك/۳)

``...You see no congruity in the creation of the Beneficient God; then look again, can you see any disorder?''(67:3)

3- Making a legitimeate use of the means provided by God (for human beings)

In a good number of verses God mentions the gifts He has granted man:

«وسخرلکم مافی السماوات و مافی الارض جمیعاً...» (الجاثیه/۱۳)

``And He has made subservient to you whatsoever is in the heavens and whatsoever is in the earth."(45:13)

«ولقد مکّنا کم فی الارض وجعلنالکم فیها معایش قلیلاً ما تشکرون» (الاعراف/۱۰)

``And certainly We have established you in the earth and made in it means of livrlihood for you, little it is that you give thanks." (7:10)

«ومن رحمته جعل لکم اللیل و النهار لتسکنوا فیه ولتبتغوا من فضله ولعلکم تشکرون» (القصص/۷۳)

``And out of His mercy He has made for you the night and day that you may rest therein, and that you seek of His grace and that you give thanks."(28:73)

«ومن آیاته ان یرسل الریاح مبشرات ولیذیقکم من رحمته و لتجری الفلك بامره ولتبتغوا من فضله ولعلکم تشکرون» (الروم/۴۶)

``And one of His signs is that He sends forth the

winds bearing good news and that He may make you taste of His mercy, and that the ships may run by His command, and that you may seek of His grace, and that you may be grateful."(30:46)

«وهوالذى جعل لكم النجوم لتهتدوا بها فـى ظـلمات البّـر والبـحر قـد فـصّلنا الآيـات لقـوم يـعلمون»
(الانعام/٩٧)

"And He it is who has made the stars for you, that you might follow the right way thereby in the darkness of the land and the sea, truly We have made plain the signs for a people who know."(6:97)

In these verses, the reason for reminding man of Allah's blessings is to make him familiar with them, to urge him to use them, and to offer his thanks to Allah. Thanksgiving means to use God's blessings in the appropiate way for which they have been bestowed by the Almighty. It is thus important for the believer to make a conscientious use of Allah's bounties, leading his society towards eternal felicity. Hence technology, which is the practical use of natural means, will be instrumental in realizing Divine goals.

IV. Ways of Understanding Nature

some Quranic verses tell us about the ways of understanding nature. We begin our discussion with the glorious verse:

«واللّـه اخـرجكـم مـن بـطون امـهاتكم لاتـعلمون
شـيئاً وجعل لكـم الســمع و الابــصار والافـئدة...»
(النحل /٧٨)

"And God has brought you forth from the wombs of your mothersöyou did not know anythingöand He gave you the hearing and the sight and the heart..."(16:78)

It says that understanding is attained through eyes, ears and intellect. Here, from amongst external senses, only sight and hearing have been mentioned, because they are the main tools with the help of which one acquires knowledge of the physical world. However, one can deduce from the Holy Quran that the senses of taste, smell, and touch are also useful in giving us valuable information about the external world, Here we quote three verses:

«...فـلما ذاقـا الشـجرة بـدت لهـما سـواتـهما وطـفقا
يخصفان عليهما من ورق الجنة...» (الاعراف /٢٢)

"...So when they **tasted** *of the tree, their shameful parts became manifest to them, and*

they both began to cover themselves with the leaves of the garden..." (7:22)

«و لما فصلت العير قال ابوهم انّى لاجد ريح يوسف لو لا ان تفندون» (يوسف/۹۴)

" And when the caravan had departed, their father said: Most surely I **smell** *the scent of Yūsuf [Joseph], unless you pronounce me to be weak in judgement." (12:94)*

«و لو نزلنا عليك كتاباً فى قرطاس فلمسوه بايديهم لقال الذين كفروا ان هذا الّا سحر مبين» (الانعام/۷)

" And if we had sent to you a writing on a paper, then they had **touched** *it with their hands, cerainly those who disbelieve would have said: This is nothing but clear enchantment." (6:7)*

The word *Fuw'ād* has been interpreted as a means of perception and reasoning. [1] Heart has also been mentioned as means of understanding and perception:

«افلم يسيروا فى الارض فتكون لهم قلوب يعقلون بها...» (الحج/۴۶)

"Have they not travelled in the land so that they should have hearts with which to understand?" (22:46)

«... لهم قلوب لا يفقهون بها...» (الاعراف/۱۷۹)

``... They have hearts with which they do not understand..." (7:179)

«... و طبع على قلوبهم فهم لا يفقهون» (التوبه/ ۸۷)

``And a seal is set on their hearts so they do not understand." (9:87)

«انّ فی ذلك لذكری لمن كان له قلب...» (ق/ ۳۷)

``Most surely there is a reminder in this for him who has a heart." (50:37)

«اولئك الذين طبع اللّه على قلوبهم و سمعهم و ابصارهم و اولئك هم الغافلون» (النحل/ ۱۰۸)

``These are they on whose hearts and hearing and eyes God has set a seal and these are the heedless ones." (16:108)

In many Islamic works, too, ``heart" has been used as a tool of reasoning. It has been cited by Imām **al-Sādiq** (AS) that:

«فمنها قلبه الذی به يعقل و يفقه و يفهم...»

``Among his organs is his heart which is the means of reasoning, perception and comprehension."[2]

It is also quoted from Imām **`Alī Ibn Muhammad al-Hādī** (AS):

«دلّ القرآن و اخبار الرسول(ص) ان القلب مالك لجميع الحواس يصحح افعالها و لا يبطل ما يصحح

القلب شیء»

"The Quran and the Traditions of the Prophet (S) indicate that 'heart' is the lord of all senses, and co-ordinates their deeds (functions); and whatever heart sets right nothing can spoil."[3]

Through the verses of the Quran, we intend to deduce that the channels through which we understand nature are:

1- External senses (by means of which observation and experimentation take place)

2- Intellect, unpolluted of vices (dominant over desires and fancies, and free from blind imitation)

3- Revelation, and inspiration.

1- The role of observation and reasoning in understanding nature

There are a number of verses in the Holy Quran that encourage man to use his senses in search of truth. Here are some examples of those verses:

«قل سيروا فی الارض فانظروا كيف بدأ الخلق...»
(العنكبوت/٢٠)

"Say:Travel on the earth and see how He made the first creation."(29:20)

قل انظروا ماذا فی السماوات والارض...»

(یونس/۱۰۱)

``Say: Consider what is it that is in the heavens and the earth." (10:101)

«افلا ینظرون الی‌الابل کیف خلقت» (الغاشیه/۱۷)

``Will they then consider the camels, how they are created?" (88:17)

«اولم یروا الی الارض کم انبتنا فیها من کل زوج کریم» (الشعراء/۷)

``Do they not see the earth, how many of every noble kind We have caused to grow in it?" (26:7)

In these verses, observation and seeing (vision) imply ``seeing with the help of right reasoning" [4]. In a number of cases certain practical experiments are mentioned as means for acquiring knowledge. We are going to cite three examples of them:

a) Through a crow, Allah teaches **Cain** how to bury a dead body:

«فبعث الله غرابا یبحث فی الارض لیریه کیف یواری سوأة اخیه قال یا ویلتی اعجزت ان اکون مثل هذا الغراب فاواری سواة اخی فاصبح من النادمین» (المائده/۳۱)

``Then God sent a crow, digging the earth, so that He might show him (Cain) how he should

cover the dead body of his brother. He said: Woe, me! Do I lack the strength that I should be like a crow and cover the dead body of my brother? So he became of those who regret." (5:31)

b) God teaches the qualified man the possiblity of giving new life to the dead:

«او كالذى مر على قرية و هى خاوية على عروشها قال أنّى يحيى هذه اللّه بعد موتها فأماته اللّه مائة عـام ثـم بعثه قال كم لبثت قال لبثت يوما او بعض يوم قال بل لبثت مائة عام فانظر الى طـعامك و شـرابك لم يـتسنّه وانظر الى حـمارك و لنـجعلك آيـة للـناس وانـظر الى العظام كيف ننشزها ثم نكسوها لحما فلما تبين له قال اعلم ان اللّه على كل شىء قدير» (البقره/٢٥٩)

``Or the like of him who passed by a town, and it had fallen down upon its roofs; he said: When will Allah give it life after its death? So Allah caused him to die for a hundred years, then raised him to life. He said:` How long have you tarried?' He said (in reply):` I have tarried a day, or part of a day.' Said He:` Nay! You have tarried a hundred years; then look at your ass and that We may make you a sign to men, and look at the bones, how we set them togegher,

then clothed them with flesh'; so when it became clear to him, he said:` I know that Allah has power over all things'." (2:259)

c) God shows `Ibrāhīm (Abraham) how He gives life to the dead:

«و اذ قال ابراهیم رب ارنی کیف تحیی المـوتی قـال اولم تؤمن قال بلی ولکن لیطمئن قلبی قال فخذ اربعة من الطیر فصرهن الیك ثم اجعل علی کل جبل منهن جزاً ثم ادعهن یاتینك سعیا واعـلم ان اللّـه عـزیز حکـیم» (البقره/۲۶۰)

``And when `Ibrāhīm [Abraham ] said: `My Lord show me how Thou givest life to the dead', He said:`What! And do you not believe?' He said:` Yes, that my heart may be at ease.' He said:` Then take four of the birds, then train them to follow you, then place on every mountoin a part of them, then they will come to you flying; and know that Allah is Mighty, Wise'." (2:260)

Besides there are many tangible parables in the Quran which are meant to teach one something perceptible:

«ومثل کلمة خـبیثة کشـجرة خـبیثه اجـتثت مـن فـوق الارض ما لها من قرار» (ابراهیم/۲۶)

``And the parable of an evil word is as an evil tree pulled up from the earth's surface; it has no

stability." (14:26)

«اللّه نورالسماوات والارض مثل نوره كمشكوة فيها مصباح المصباح فى زجاجة الزجاجة كانّها كوكب درى يوقد من شجرة مباركة زيتونة لا شرقية و لاغربية يكاد زيتها يضىء ولولم تمسسه نار نورعلى نوريهدىاللّه لنوره من يشاء...» (النور/٣٥)

"Allah is the light of the heavens and the earth; a likeness of his light is as a niche in which is a lamp, the lamp is in a glass, (and) the glass is as it were a brightly shining star, lit from a blessd olive-tree, neither eastern nor western, the oil whereof almost gives light though fire touch it notölight upon lightö Allah guides to his light whom He pleases..." (24:35)

«واللّه الذى ارسل الرياح فتثيرسحاباً فسقناه الى بلدميت فاحيينابه الارض بعد موتها كذلك النشور» (فاطر/٩)

"And God is He Who sent the winds so they rise a cloud, then We drive it on to a dead country and therewith We give life to the earth after death, even so is the quickening." (35:9)

Therefore, there is no doubt that the Quran considers external senses the primary tools in getting a part of our knowledge; but both in the above verses,

and in many others to come, sensory stimuli have not been suggested as the sole source of nature's cognition. In order to substantiate this claim we can advance the following arguments;

1- In most of the Quranic verses, wherever natural phenomena are mentioned, it is explicity pointed out that the perception of Divine signs in nature and their relation to the Lord of signs is within the reach of men of intellect, capable of reflection. Here are a few examples of such verses:

«هوالذی انزل من السماء ماءً لکم منه شراب و منه شجرفیه تسیمون ینبت لکم به‌الزرع والزیتون و النخیل والاعناب و من کل الثمرات ان فی ذلك لایة لقوم یتفکرون» (النحل/۱۰-۱۱)

"He it is who sends down water from the heaven (cloud) for you, it gives drink, and by it (grow) the trees upon which you pasture. He causes to grow for you thereby herbage, and the olives and the palm trees, and the grapes and of all the fruits, most surely there is a sign in this for a people who reflect."(16:10-11)

«وهوالذی جعل لکم النجوم لتهتدوا بها فی ظلمات البَرّ والبحر،قدفصّلنا الایات لقوم یعلمون» (الانعام/۹۷)

"And He it is Who made the stars for you that you that you might follow the right way thereby in the darkness of the land and the sea. Truly we have made plain the signs for a people who know."(6:97)

«وسخّرلكم الليل و النهاروالشمس والقمروالنجوم مسخرات بامره انّ فى ذلك لآيات لقوم يعقلون»
(النحل/١٢)

"And He has made subservient for you the night and the day and the sun and the moon and the stars are subservient by His commandment; most surly there are signs these for a people who ponder."(16:12)

«و من كل شىء خلقنا زوجين لعلكم تذكرون»
(الذاريات/٤٩)

"And of everything we have created pairs that you may be mindful."(51:49)

«وهوالذى أنشأكم من نفس واحدةفمستقر و مستودع قد فصّلنا الآيات لقوم يفقهون» (الانعام/٩٨)

"And He it is Who has brought you into you into being from a single, then there is (for you) a resting place and a depository indeed. We have made plain the signs for a people who understand."(6:98)

The use of such words as ``*Tafakkur, ta`aqqull* and *tafaqquh* ..." in the above verses indicate (with different shades of emphasis) that to understand nature, one should make use of one's intellect.

The word *tafakkur* (meditation) in many of the verses means reflection on existing information and moving towards fresh awareness.[5]

(a) The words *Ta`aqqul* and *Tafaqquh* show the intellectual advancement. Therefore the cognition that originates through the senses should be backed by reflection and reasoning in order to enhance our knowledge. The following quotations from Imām **al-Sādiq** (AS) confirm this point:

»ان اول الاموروومبدأها وقوتهاو عمارتهاالتى لاينتفع بشــىء الابه،العقل الذى جعله اللّه زينة لخلقه و نوراً لهم،فبالعقل عرف العباد خالقهم، وانهممخلوقون، انه المدبرلهم و انهم المدبرون ... واستدلوا بعقولهم على مارأوامن خلقه، و من سمائه وارضه، و شمسه و قمره، وليله و نهاره، و بان له و لهم خالقاً و مدبراً لم يزل ولايزول، و عرفوا به الحسن من القبيح، وان الظمة فى الجهل، و ان النورفى العلم، فهذا مادلهم عليه العقل.«

``The origin and commencement of everyhing, and the cause of their flourishing, is the intellect without which nothing can be achieved. God

has endowed His servants with the light and ornamant of intellect.

By means of intellect the servants know their Creator and get to understand that He is the Ruler and they are under His rule, He is immortal and they are mortal. Their intellect directs them to infer through the observation of the handiwork of God such as the heavens, the earth, the sun, the moon, the day and night...-That there is a Creator and Controller of all these beings, and He has always been and will exist forever. It is through the intellect that man recognizes grace from disgrace, and realizes that light is associated with knowledge, and ignorance bears darkness. This inference can be made only through the intellect.'[6]

(b) Shaykh **Mufīd**, in his book *al-`Irshād*' narrates that **Abū Shākir Daysāni** said to Imām al-Sādiq (AS): ``You know that we do not accept anything unless we see, hear, taste, smell or feell it with our senses". Imām **al-Sādiq** (AS) answered:

ذكرت الحواس الخمس و هى لاتنفع فى الاستنباط الآ بدليل، كمالا تقطع الظلمة بغير مصباح.

``You mentioned the five senses, but they never

> *find the truth unless their findings are steered through the channel of intellect, in the same manner as darkness cannot be removed except with a lamp."*[7]

(c) There is another quotation from Imām al-Sādiq (AS) which says:

> فـانك لو رأيت حـجراًيـرتفع فـىالهـواء، عـلمت ان رامياًرمى به، فليس هذا العلم من قبل البصر، بل من قبل العقل، لان العـقل هـوالذى يـميّزه، فـيعلم ان الحـجر لايذهب علّواًتلقاء نفسه...»

> *"When you see a stone moving upwards in the air, you know that some person has thrown it. This knowledge has not come to you through your eyes, but through the channel of intellect, because it is intellct which infers that a stone cannot go up in the air by itself."*[8]

Therefore, it can be concluded that though observation and exprimentation are indispensible for obtaining information from the external world, they are not a sufficient means. Should we rely solely on external senses, we will not be able to interpret the physical world, and find the relation between natural events. In fact, man is no different from other animals as far as external senses are concerned, and some of

the animals in this repect, are even better equipped than human beings. What distinguishes man from animals is his talent for profound observation of the world and the interpretaion of events. And this is due to a faculty called rational faculty, which is capable of relating the signs and symbols attained through the senses, and then interpreting them. Senses give us a series of isolated signs and symdols, and intellect discovers their inter-relationship.

2- In the Quran, there are many verses denoting that in some people, eyes, ears and heart do not perform their roles, and while seeing the Almighty's signs in nature, they do not meditate on them, nor do they benefit from those (blessings):

«وكايّن من آية فى السماوات و الارض يمّرون عليها و هم عنها معرضون» (يوسف/١٠٥)

"And how many a sign in the heavens and the earth they pass by, yet they turn aside from it."(12:105)

«...لهم قلوب لايفقهون بها ولهم اعين لايبصرون بها و لهم آذان لايسمعون بها...»(الاعراف/١٧٩)

"...They have hearts with which they do not understand, and they have eyes with which they do not see, and they have ears with which they

do not hear."(7:179)

«...ام لهم اعين يبصرون بها ام لهم آذان يبصرون بها...» (الاعراف/۱۹۵)

"...Or have they eyes with which they see, or have they ears with which they hear...?"(7:195)

«ولاتكونوا كالذين قالوا سمعنا وهم لايسمعون» (انفال/۲۱)

"And be not like those who said,'we hear', and they did not hear."(8:21)

«وان تدعوهم الى الهدى لايسمعوا و تريهم ينظرون اليك و هم لايبصرون» (الاعراف/۱۹۸)

"And if you invite them to guidance, they do not hear, and you see them looking towards you, yet they do not see."(7:198)

«افلم يسيروا فى الارض فتكون لهم قلوب يعقلون بها اوآذان يسمعون بها فانّها لا تعمى الابصارولكن تعمى القلوب الّتى فى الصدور» (الحج/۴۶)

"Have they not trvelled in the land so that they should have hearts with which to undersand, or ears with which to hear? For surely it is not eyes that are blind, but blind are the hearts which are in the breasts."(22:46)

It is quoted from our great **Prophet Muhammad** (SA) that:

«ليس الاعمى من يعمى بصره،انماالاعمى مـن تـعمى بصيرته»

"Blind is not a person who lacks eyes, but the one who lacks insight."[9]

Some people, interpreting the above verses, rightly say that we have two kinds of sight and hearingöthe physical or external and spiritual or internal ones. The external organs of sight and hearing are tools for perception, and the internal ones serve for the appropriate use of those tools.

Fakhr al-Dīn Rāzī refers to the following verse:

«مـــثل‌الفـــريقين كـــالاعمى والأصـــمّ‌والبـــصير...» (هود/٢٤)

"The likeness of the two parties is as that of the blind and the deaf."(11:24)

and says:

"There is a similarity in the creation of body and spirit; that is, both have eyes and ears. In the same way that a deaf and blind person, in absolute silence and darkness, finds himself at a loss, an astray, irreligious and ignorant person's heart, too, lacks the power of sight and hearing and he is lost in wilderness."[10]

We would rather interpret the above verses in this way: that eyes, ears and other external senses are means for the intellect, and their acquisitions could be complete and meaningful if they go through the channel of the intellect. Eyes see, but the intellect interpets the result of sight and issues the verdict.[11] The function of sight can be considered complete when it goes with insight, i.e when sensory perception is supplemented with (supra-sensory) intellect. Here are a few verses confirming this interpretation:

«افانت تسمع الصّم ولو كانوا لايعقلون»(يونس/۴۲)

``...But can you make the deaf to hear though they will not understand?"(10:42)

«ولاتكونوا كالذين قالوا سمعنا و هم لايسمعون* ان شرالدواب عنداللّه الصم البكم الذين لايعقلون» (الانفال ۲۱-۲۲)

``And be not like those who said, `we hear', and they did not hear. Surely the vilest of animmals in Allah's sight are the deaf, the dumb, who do not understand."(8:21-22)

It has been quoted from Imām `Alī (AS) in *Nahj al-Balāghah*:

«فانّماالبصير من سمع فتفكرو نظرفابصر، وانتفع بالعبرثم سلك جدداً واضحاً و تجنب الصرعه فى

المهاوی و الضلال فی المغاوی»

``The observer is one who reflects on what he has heard, reflects upon what he has seen, and makes use of his instructive experience in choosing to tread on clear paths wherein he can avoid falling into hallows and staying into pitfalls."[12]

There is a statement narrated from Imām **al-Sādiq** (AS):

«زعمت ان الاشیاء لاتدرك الابالحواس فانّی اخبرك انّه لیس للحواس دلالة علی الاشیاء ولافیها معرفة الا بالقلب فانه دلیلها و معرفها الاشیاء الّتی تدّعی ان القلب لایعرفها الآبها...ان القلب یفكّر بالعقل الذی فیه...

«ان اللّه تعالی جعل القلب مدبرا للجسد، به یسمع و به یبصر و هوالقاضی والامیرعلیه،و به ینزل الفرح و الحزن، و به ینزل الالم، ان فسدشیء من الحواس بقی علی حاله، وان فسد القلب ذهب جمیعا حتی لایسمع و لایبصر»

``...You thought things could not be felt except through senses. Let me advise you that senses do not directlylead you to objects, and we know objects only through the channel of heart; therefore, it is heart which directs the senses and presents objects to the senses, the objects that

you (mistakenly) claim are not known to the heart but through senses...Heart reflects by the intellect which it possesses. The Almighty God made heart the administrator of the body and it hears and sees through the heart. Heart is the judge and ruler of the body. Should heart delay, the body cannot proceed, should it proceed the body cannot tarry. Senses see and hear through the heart; should it order senses, they obey; should it hinder them, they stop. Happiness and sorrow, too, befall man through the heart and make him endure them. If senses fail and decay, heart goes on functioning; but with the decay of heart all the senses disappearöman neither sees nor hears."[13]

3-The Quranic verses indicate that in addition to sense-rooted cognitions, there are non-sensory cognitions, too. These verses fall into two groups:

(a) In one group of the verses Allah refutes the arguments of the people who consider their external senses as the only reliable source for their knowledge:

«واذ قلتم يا موسى لن نؤمن لك حتّى نرى اللّه جهرةً فاخذتكم الصاعقه و انتم تنظرون» (البقره/۵۵)

"And when you said: O Musa! We will not

believe in you unil we see Allah manifestly, so the punishment overtook you while you looked on."(2:55)

«وقالوا لن نؤمن لك حتى تفجرلنا من الارض ينبوعاً* اوتكون لك جنة من نخيل و عنب فتفجر الانهار خلالها تفجيراً* اوتسقط السماء كما زعمت علينا كسفاً اوتأتى بالله و الملائكة قبيلاً* اويكون لك بيت من زخرف اوترقى فى السماء ولن نؤمن لرقيك حتى تنزل علينا كتاباً نقرؤه قل سبحان ربى هل كنت الاّ بشراً رسولاً»

(الاسراء/٩٠-٩٣)

"And they said: 'We will by no means believe in you until you cause a fountain to gush forth form the earth for us.'

'Or you should have a garden of palms and grapes in the midst of which you should cause rivers to flow forth gushing out.'

'Or you should cause the heaven to come down up on us in pieces as you think, or bring Allah and the angels face to face (with us)'

'Or you should have a house of gold, or you should ascend into heaven, and we will not believe in your ascending until you bring down to us a book which we may read.'

Say: 'Glory be to my Lord. I am not but a

mortal messenger?"(17:90-93)

«يعلمون ظاهراً من الحيوة الدنيا و هم عن الآخرة هم غافلون» (الروم/٧)

``They know the outward of this world's life, but of the Hereafter they are absolutely heedless."(30:7)

(b) The Quran repeatedly reminds us that we do not perceive many of the realities of the physical world through external senses:

«اللّه الذى رفع السماوات بغير عمد ترونها...»(الرعد/٢)

``Allah is He who raised the heavens without any pillars you see..."(13:2)

«فلا اقسم بما تبصرون* و ما لا تبصرون» (الحاقه/٣٨-٣٩)

``But nay! I swear by that which you see, and that which you see not." (69:38ö39)

«سبحان الذى خلق الازواج كلها مما تنبت الارض و من انفسهم و مما لايعلمون...» (يس/٣۶)

``Glory be to Him who created pairs of all things, of what the earth grow, and of their kind and of what they do not know."(36:36)

And we also learn from the Quran that only Allah is aware of the mystetries in the heavens and the earth,

and those to whom Allah has granted this bliss:

«ولله غيب السماوات والارض واليه يرجع الامركله» (هود/١٢٣)

"And Allah's is the unseen in the heavens and the earth and to Him is returned the whole of the affair."(11:123)

«قل الله اعلم بمالبثوا له غيب السماوات والارض...» (الكهف/٢٦)

"Say: Allah knows best how long they remained: To Him are (known) the unseen things of the heavens and the earth."(18:26)

«ان الله يعلم غيب السماوات والارض والله بصيربما تعملون»(الحجرات/١٨)

"Surely Allah knows the unseen things of the heavens and the earth; and Allah sees what you do."(49:18)

«عالم الغيب فلايظهر على غيبه احداً الآ من ارتضى من رسول...» (الجن/٢٦-٢٧)

"The knower of the unseen. So He does not reveal His secrets to any except to him who He regards as a messenger."(72:26-27)

Unfortunately, in recnt centuries, some Muslim scholars have wrongly propounded the view that experiments are the only means of acquiring

knowledge, and that the experimental study of the book of nature suffices to know God.[14]

We, too, agree that experiment and observation are indispensible tools for undersanding nature. We even believe that the Muslims' work in this field has been quite inadequate. But we also believe that our undersanding of nature is not purely a matter of the senses. Besides, our observations and experiments cannot be the source of any knowledge unless they are channelized via intellectual principles.

In the matter of scintific cognition of God, we are of the same opinion as that expressed by the late professor Murtadā **Mutahharī**:

> *"The boundary of experiment is only the cognition of the works of God, but the cognition of God through the works known by experiment is a kind of pure intellectual deduction."*[15]

The reason is obvious: there are many who perform experiments, but they do not attain the cognition of God.

Science only nominally consists of issues verifiable dy experimental methods. Many issues have not directly resulted from experiment. In fact, one may say that in all natural sciences, our knowledge is mainly

based on deduction, and we have not obtained any of the rules and laws in physics or chemistry from experiment, but they are based on intellectual deductions. The matter itself has come to be known through intellectual deduction, because experiments in plysics or chemistry provide us only with the properties of matter.

This view, that most of our knowledge of the physical world has come through intellctual deduction, is not shared by most scholars in natural sciences in recent years. But as Albert Einstein [16] rightly advised, we had better not listen to what physicicists say, but rather see what they do. The fact is that many of the scientists with positivistic views, have overlooked their own claim. Moreover, among western scholars in natural sciences, we find some outstanding figures who admit the decisive role of intellectual deductions and interpretation in our knowledge of natural phenomena. **Max Planck** in a paper entitled ``The Scientist's Picture of the Physical World" says:

> *``The ideal aim before the mind of the physicist is to understand the external world of reality. But the means which he uses to attain this end are what are known in physical science as*

`measurements', and these give no direct information about extrnal reality. They are only a register or representation of reactions to physical phenomena. As such they contain no explicit information and have to be interpreted. As Helmhotlz said, measurements furnish the physicist with a sign which he must interpret, just as a language expert interprets the text of some prehistoric document that belongs to a culture utterly unknown. The first thing which the language expert assumesö and must assume if his work is to have any practical meaningö is that the document in question contains some reasonable message which bas been stated according to some system of grammatical rules or symbols. In the same way the physicist must assume that the physical universe is governed by some system of laws which can be understood, even though he cannot hold out himself the prospect of being able to understand them in a comprehensive way or to discover their character and manner of operation with anything like a full degree of certitude.

Taking it, then, that the external world of reality is governed by a system of laws, the physicist now constructs a synthesis of concepts and theorems; and this synthesis is called the scientific picture of the physical universe. It is a representation of the real world itself in so far as it corresponds as closely as possible to the information which the resarch measurements have supplied. Once he has accomplished this, the researcher can assert, without having to fear the contradiction of facts, that he has discovered one side of the outer world of reality, though of course he can never logically demonstrate the truth of the assertion."[17]

In a lecture, delivered by **Einstein** at Oxford University in 1933, under the title of ``On Methods of Theoretical Physics", he said:

``... *Newton, the first creator of a comprehensive, workable system of theoretical physics, still believed that the basic concepts and laws of his system could be derived from experience. This is no doubt the meaning of his saying, 'hypotheses non fingo'.*

Actually the concepts of time and space

appeared at that time to present no difficulties. The concepts of mass, inertia, and force, and the laws connecting them, seemed to be drawn directly from experience. Once this basis is accepted, the expression for the force of gravitation appears derivable from experience, and it was reasonable to expect the same in regard to other forces.

We can indeed see from Newton's formulation of it that the concept of absolute space, which comprised that of adsolute rest, made him feel uncomfortable; he realized that there seemed to be nothing in experience corresponding to this last concept. He was also not quite comfortable about the introduction of forces operating at a distance. But the tremendous partial success of his doctrines may well have prevented him and the physiscists of the eighteenth and nineteenth centuries from recognizing the fictious character of the foundations of his system.

The natural pohilosophers of those days were, on the contrary, most of them possessed with the idea that fundamental concepts and

postulates of physics were not in the logical sense, free inventions of the human mind, but could be deduced from experience by `abstraction'öthat is to say, by logical means. A clear recognition of the erroneousness of this notion really came with the general theory of relativity, which showed that one could take account of wider range of empirical facts, and that, too, in a more satisfactory and complete manner, on a foundation quite different from the Newtonian. But quite apart from the question of the superiority of one or the other, the fictitous character of fundamental principles is perfectly evident from the fact that we can point to two essentially different principles, both of which correspond with experience to a large extent; this proves at the same time that every attempt at a logical deduction of the basic concepts and postulates of mechanics from elementary experiences is doomed to failure.

If, then, it is true that the axiomatic basis of theoretical physics cannot be extracted from experience but must be freely invented, can we ever hope to find the right way? Nay, more, has

this right way any existence outside our illusions? Can we hope to be guided safely by experience at all when there exist theories (such as classical mechanics) which to a large extent do justice to experience, without getting to the root of the matter? I answer without hesitation that there is, in my opinion, a right way, and that we are capable of finding it. Our experience hitherto justifies us in believing that nature is the realiztion of the simplest conceivable mathematical ideas. I am convinced that we can discover by means of purely mathematical constructions, the concepts and the laws connecting them with each other, which furnish the key to the understanding of natural phenomena. Experience may suggest the appropriate mathematical concepts, but they most certainly cannot be deduced from it. Experience remains, of course, the sole criterion of the physical utility of a mathematical construction. But the creative principle resides in mathematics. In a certain sense, therefore, I hold it true that pure thought can grasp reality, as the ancients dreamed."[18]

In his book *Physics and Beyond*, **Heisenberg** writes[19] that in the year 1926 he was of the opinion that Einstein still believed in the positivistic view of Mach, that is, he believed that only observable quantities should be included in physical theories. Therefore, when Einstein said: `but you do not seriously believe that none but observable magnitudes must go into a physical theory?', Heisenberg asked in some surprise: ``Isn't that precisely what you have done with relativity? ... After all, you did stress the fact that it is impermissible to speak of absolute time, simply because absolute time cannot be observed; that only clock readings, be it in the moving reference system or the system at rest, are relevant to the determination of time." **Einstein** then admitted:

> *``Possibly I did use this kind of reasoning but it is nonsense all the same. Perhaps I could put it more diplomatically by saying that it may be heuristically useful to keep in mind what one has actually observed. But in principle, it is quite wrong to try founding a theory on observable magnitudes alone. In reality the very opposite happens. It is the theory which decides what we can observe."*

Philip Frank in his biography of Einstein says[20] that he once told Einstein that he himself had introduced the positivistic view into physics. **Einstein** answered: ``A good joke should not be repeated too often".

Our purpose in citing these quotations is to point out that many of the recent outstanding research scholars, too, have been fully aware of the inadequacy of experiments for the interpretation of nature. Otherwise, we do not doubt the importance and indispensibity of experiments, and Muslim researchers should not forget the message carried in such verses:

«قل سيروا في الارض فانظروا كيف بدأ الخلق...»
(العنكبوت/٢٠)

``Say: Travel in the earth and see how He made the first creation..."(29:20)

«قل انظروا ماذا في السماوات والارض...»
(يونس/١٠١)

``Say: Consider what is it that is in the heavens and the earth..."(10:101)

We should also bear in mind that while the Quran invites us to the experimental study of nature, it also points out the importance of reasoning, and teaches us not to be satisfied with mere sensory experience, but

by observing what is beyond the observable part of nature, we move closer to the Creator of nature.

2- The role of revelation and inspiration in understanding nature

It is deduced from some verses in the Quran that the true teacher of all sciences is the Omniscient:

«اقرأ باسم ربك الذى خلق* ... * الذى علم بـالقلم*
علم الانسان مالم يعلم» (العلق/١-٥)

``Read in the name of your Lord Who created...Who taught (to write) with the pen. Taught man what he knew not.''(96:1-5)

«خلق الانسان* علّمه البيان» (الرحمن/٣-٤)

``He created man, and taught him to talk.''(55:3-4)

«و علّم آدم الاسماء كلّها...» (البقره/٣١)

``And taught Adam all the Names,...''(2:31)

The least we can infer from these verses is that God has endowed man with talent to acquire knowledge and has given him the necessary means. But some Muslim philosophers believe that the role of observations in the perception of apriori knowledge and the role of preliminary matters in the perception of theoretical subjects is to prepare man's soul to fully

benefit from the spiriutal world.[21]

In fact the main source of inspiration in the matter of knowledge for human beings is the Omniscient Donor of knowledge, Allah. But the degree of relation between human beings and this Source differs from person to person. Some think and get nowhere, whereas some others find some truth through meditation; and yet there are some others who become aware of many realities with only little speculation.

Some Quranic verses indicate that besides ordinary channels of observation, meditation and intellection, threre is a more direct way of attaining the knowledge of the realities of the world through the Donor of knowledge; but this way is not a general one and only a handful of selected believers have access to it. These verses may be divided into several groups.

1- It is stated in some verses that God reveals special knowledge to certain select believers:

«و قتل داود جالوت و آتاه اللّه الملك و الحكمة و علّمه ممّا يشاء...» (البقره/۲۵۱)

"And Dawūd (David) slew Jālūt, and God gave him kingdom and wisdom, and **taught him** *of what he pleased." (2:251)*

«ربّ قــد آتـيتنى مـن المـلك و عـلّمتنى مـن تأويـل الاحاديث...» (يوسف/١٠١)

"My Lord. Thou hast given me of the kingdom and **taught me** *of the interpretation of sayings..."(12:101)*

«فوجدا عبداً من عبادنا آتيناه رحمة من عندنا و علّمناه من لدنّا علماً» (الكهف/٦٥)

"Then they found one from among Our servants whom We had granted from Us and whom **We had taught** *knowledge from Oursrelves."(18:65)*

«...اذقال اللّه ياعيسى آبن مريم ...واذعلّمتك الكتاب والحكمة والتورية والانجيل...» (المائدة/١١٠)

"... When God will say: o' `Īsā (Jesus Christ) son of Maryam (Mary), remember My favour on you and on your mother, when I strengthened you with the Holy spirits, you spoke to the people in the cradle and when of old age, and when I **taught you** *the Book and the Wisdom and the Tawrāh (Torah) and the Injīl (Bible)..."(5:110)*

«...وانّــه لذوعــلم لمــا عـلّمناه ولكـن اكـثر النـاس لايعلمون» (يوسف/٦٨)

"And surely he was possessed of knowledge because **We had given him knowledge** *but most*

people do not know." (12:68)

«وداود و سليمان اذ يحكمان في الحرث...* ففهمناها
سليمان وكلاً اتينا حكماً و سخرنا مع داود الجبال
يسبّحن والطير و كنافاعلين* و علّمناه صنعة لبوس لكم
لتحصنكم من بأسكم فهل انتم شاكرون»
(الانبياء/ ٨٠-٧٨)

``And Dāwūd (David) and Sulaymān (Solomon) when they gave judgement concerning the field when the people's sheep pastured therein by night, and we were bearer of witness to their judgement. So we made Sulayman to understand; and **to each one We gave wisdom and knowledge;** *and We made the mountains, and the birds to celebrate Our praise with Dawūd; and We were the doers. And* **We taught him** *the making of coats of mail for you, that they might protect you in your wars; will you then be grateful?"(21:78-80)*

In some of the verses, the idea that this way of teaching can be accomplished through human teachers has been rejected:

«ان هو الاّ وحي يوحى* علّمه شديدالقوى»
(النجم/ ۴-۵)

``It is naught but revelation that is revealed. The

Lord of Mighty Power has taught him."(53:4-5)

«ولقد نعلم انّهم يقولون انّما يعلّمه بشر...»
(النحل/١٠٣)

"And certainly We know that they say: only a mortal teaches him."(16:103)

«...وانزل الله عليك الكتاب والحكمة و علّمك مالم تكن تعلم...» (النساء/١١٣)

"And God has revealed to you the Book and the wisdom, and **He has taught you** *what you did not know."(4:113)*

2- Another group of verses indicate revelation to prophets:

«ذلك ممّا اوحى اليك ربك من الحكمة...»
(الاسراء/٣٩)

"This is of what your Lord has revealed to you of wisdom." (17:39)

«فاوحى الى عبده ما اوحى* ماكذب الفؤاد ما رأى»
(النجم/١٠-١١)

"And He revealed to His servant what He revealed. His heart lies not of what he saw."(53:10-11)

«انّا اوحينا اليك كما اوحينا الى نوح و النبيين من بعده و اوحينا الى ابراهيم واسمعيل و اسحق و يعقوب والاسباط و عيسى و ايوب و يونس و هرون و سليمان

و اتيناداودزبورا» (النساء/١۶٣)

``Surely We have revealed to you as We revealed to Nūh (Noah), and the prophets after him, and We revealed to Ibrāhim (Abraham) and Ismā'īl (Ismael) and Ishāq (Isaac) and Yaqūb (Jacob) and the tribes and `Isā (Jesus Christ) and Ayyūb (Job) and Yūnus (Jonah) and Hārūn (Aaron) and Sulaymān (Solomon) and We gave to Dāwūd (David) Psalms"(4:163)

«و اوحينا الى موسى ان الق عصاك فاذا هى تلقف ما يأفكون» (الاعراف/١١٧)

``And We revealed to Mūsā (Moses) saying: Cast your rod, then,lo! it devoured the lies they told."(7:117)

«اكان للناس عجباً ان اوحينا الى رجل منهم ان انذر الناس...» (يونس/٢)

``What! Is it a wonder to the people We revealed to a man from among themselves saying: `Warn the people'...?" (10:2)

«و اوحينا الى موسىٰ واخيه تبوّا لقومكما بمصر بيوتاً...» (يونس/٨٧)

``And We revealed to Mūsā and his brother, saying: Take for your people houses to abide in..."(10:87)

«فاوحينا اليه ان اصنع الفلك...» (المؤمنون/۲۷)

"So We revealed to him saying: 'Make the Ark'..."(23:27)

«ذلك من انباء الغيب نوحيه اليك...» (آل‌عمران /۴۴)

"This is of the announcements relating to the unseen which We reveal to you."(3:44)

«و ما ارسلنا من قبلك الّا رجالاً نوحی اليهم...» (النحل/۴۳)

"And We did not send before you any but men to whom We sent revelation."(16:43)

«قل انّما انابشر مثلكم يوحی الیّ...» (الكهف/۱۱۰)

"Say: I am only a mortal like you, it is Revealed to me..."(18:110)

3- Yet another group of verses indicate the possibility of revelation for people other than prophets:

«واذا وحيت الى الحواريين ان امنوا بی و برسولی قالوا امنّا واشهد باننا مسلمون» (المائده/۱۱۱)

"And when I revealed to the disciples, saying, Believe in Me and My messenger, they said: we believe and bear witness that we submit (ourselves)."(5:111)

«و اوحينا الی ام موسی ان ارضعيه...» (القصص/۷)

``And we revealed to Mūsā's mother, saying: Give him suck."(28:7)

In this case, ``revelation" is interpeted [22] as ``inspiration". Of course, revelation has been used in other senses as well.[23]

What we may conclude from these is the possibility of learning from the Donor of knowledge through a channel different from the common channel of observation and thinking. This, too, has different levels: the highest level of revelation is reserved for prophets only, and according to the glorious verse:

«وما كان لبشر ان يكلمه الله الاوحياً أومن وراء حجاب او يرسل رسولاً فيوحى باذنه ما يشاء...»
(الشورى/۵۱)

``And it is not for any mortal that God should speak to him except by revelation or from behind a veil, or by sending a messnger and revealing by His permission what He pleases..."(42:51),

it is done through a direct inducement of the meaning in the prophet's heart, or by the creation of words or by sending an angel messenger to him.[24] On the lower levels, this is done through inspiration, which is variouly termed as *kashf* (كشف) or *`ilhām* (الهام).

Muslim philosphers believe that the people having talent for attaining such immediate knowledge are those who are endowed with a saintly faculty (قوة قدسية). To explain their reasoning we take a look back, and notice that one of the channels to cognition is (logical) thinking. In thinking, the mind undergoes a two-stage movement, and shuttles between the known and the unknown. In thinking one seeks a middle term that is common in both the given propositions with the help of which he hopes to understand the unknown. In general, finding the middle term requires certain premises. Yet in certain special cases some people may reach the middle term and the conclusion without forming a syllogism in their minds.[25] This mental talent which takes one to the goal without following logical steps is called `intuition' (حدس) and in its highest form has been called `the saintly faculty' (قوة قدسية). A person having this gift can know many realities the use of his sensory and rational faculies. Ibn Sīnā (Avicenna) in his *al-Ishārāt* says[26] that the following Quranic phrase refers to this special mental faculty:

«يكاد زيتها يضيء و لولم تمسسه نار» (النور/۳۵)

``The oil where of almost gives light though fire

touch it not..."(24:35)

and he confirms its existence in the following statement:

> *"You may wish to have more evidence to prove the existence of the saintly faculty gift. So hark! Do you not know that 'intuition' exists, and people possess different levels of reflection. Some are so dull and stupid that they find no way to their goal; some others are moderately intelligent and can make use of their reasoning power and some others, more intelligent, can perceive intelligibles through intuition. This intelligence differs from person to person; at the lowest level, man is completely deprived from intuition; at the highest level, one does not need to learn (through regular course) or think through logical categories (for knowing the reality)."*[27]

Now we are in a position to say that in the same way that revelation has various degrees, as asserted in the following verse:

«تلك الرسل فضلّنا بعضهم على بعض منهم من كلّم اللّه
و رفع بعضهم درجات و اتينا عيسى ابن مريم البينات و
ايّدناه بروح القدس...» (البقره/۲۵۳)

> *"We have made some of these messengers to excel the others: among them are they to whom God spoke, and some of them He exalted by (many) degrees of rank: We gave clear miracles to 'Īsā (Jesus) son of Maryam (Mary), and strengthened him with the Holy Spirit."(2:253),*

inspiration, too. is of different levels though on the whole it is lower than revelation. Some people enjoy this gift at its highest level and others possess it in its weaker forms. For the former, realities are made manifest without the effort of reflection, while the latter attain new knowledge through their own endeavours. Some of the contemporary scholars have accepted the existence of this power. Dr. **Alexis Carrel** in his book *Man, the Unknown* says:

> *"Obviously, great discoveries are not the product of intelligence alone. Men of genius, in addition to their powers of observation and comprehension, posses other qualities, such as intuition and creative imagination. Through intuition they learn things ignored by other men, they perceive relations between seemingly isolated phenomena. They unconsciously feel the presence of the unknown treasure. All great*

men are endowed with intuition. They know, without analysis, without reasoning, what is important for them to know. A true leader of men does not need psychological tests, or reference cards, when choosing his subordinates. A good judge, without going into the details of legal arguments, and even, according to Cardozo, starting from erroneous premises is capable of rendering a just sentence. A great scientist instinctively takes the path leading to a discovery. This phenomenon, in former times, was called inspiration.

Men of science belong to two different typesöthe logical and the intuitive. Science owes its progress to both forms of mind. Mathematics, although a purely logical structure, nevertheless makes use of intuition. Among the mathematicians there are intuitives and logicians, analysts and geometricians. Hermite and Weierstrass were intuitives, Riemann and Bertrand, logicians. The discoveries of intuition have always to be developed by logic. In ordinary life, as in science, intuition is a powerful but dangerous means of

acquiring knowledge. Sometimes it can hardly be distinguished from illusion. Those who rely upon it entirely are liable to mistakes. It is far from being always trustworthy. But the great man, or the simple whose heart is pure, can be led by it to the summits of mental and spiritual life. It is a strange quality. To apprehend reality without the help of intelligence appears inexplicable. One of the aspects of intuition resembles a very rapid deduction from an instantaneous observation. The Knowledge that great physicians sometimes possess concerning the present and the future state of their patients is of such a nature. A similar phenomenon occurs when one appraises in a flash a man's value, or senses his virtues and his vices. But under another aspect, intuition takes place quite independently of observation and reasoning. We may be led by it to our goal when we do not how to attain this goal and even where it is located. This mode of knowledge is closely analogous to clairvoyance, to the sixth sense of Charles Richet."[28]

And in the words of the Nobel laureate physicist

Charles H. Townes:

``Religion's discoveries often come by great revelations. Scientific knowledge, in the popular mind, comes by logical deduction, or by the accumulation of data which is analyzed by established methods in order to draw generalizations called laws. But such a description of scientific discovery is a travesty on the real thing. Most of the important scientific discoveries come about very differently and are much more closely akin to revelation. The term itself is generally not used for scientific discovery, since we are in the habit of reserving revelation for the religious realm. In scientific circles one speaks of intuition, accidental discovery, or says simply that ``he had a wonderful idea."

If we compare how great scientific ideas arrive, they look remarkably like religious revelation viewed in a non-mystical way. Think of Moses in the desert, long troubled and wondering about the problem of saving the children of Israel, when suddenly he had a revelation by the burning bush. A similar pattern is seen in many

of the revelations of the Old and New Testaments. Think of Gautama the Buddha who traveled and inquired for years in an effort to understand what was good, and then one day sat down quietly under a Bo tree where his ideas were revealed. Similarly, the scientist, after hard work and much emotional and intellectual commitment to a troubling problem, sometimes suddenly sees the answer. Such ideas much more often come during off-moments than while confronting data. A striking and well-known example is the discovery of the benzene ring by KekulÅ, who while musing at his fireside was led to the idea by the vision of a snakelike molecule taking its tail in its mouth. We cannot yet describe the human process which leads to the creation of an important and substantially new scientific. But it is clear that the great scientific discoveries, the real leaps, do not usually come from the so-called ``scientific method", but rather more as did KekulÅ'swith perhaps less picturesque imagery, but by revelations which are just as real."[29]

Finally I would like to mention that though

inspiration and enlightenment are means to attain knowledge, not everybody receives this gift:

«ذلك فضل الله يؤتيه من يشاء...» (الجمعه/۴)

"That is God's grace; He grants it to whom He pleases." (62:4)

The only way which is open to everyone is the channel of observation and reflection while aiming at attaining the knowledge of nature. The conditions leading to proper result shall be discussed in a later part of our discourse.

V. Stages In Understanding Nature

We have already seen that from the viewpoint of Quran man has the capacity to understand nature.

With the use of external senses and intellect, human beings should get closer to God through understanding Divine signs. Here we have to mention that wherever there is a reference in the Quran to the Divine evidences in the physical world, Allah attributes the ability of understanding them to special groups of people. Here are a few examples:

On Meditators:

«هوالذی انزل من السماء ماءً لکم منه شـراب و مـنه

شجرفيه تسيمون* ينبت لكم به الزرع والزيتون و
النخيل و الاعناب و من كل الثمرات ان فى ذلك لاية
لقوم يتفكرون» (النحل/١٠-١١)

"He it is who sends down water from the cloud for you, it gives drink and by it (grow) the trees upon which you pasture. He caures to grow for you thereby hebage, and the olive, and the palm tree, and the grapes, and of all the fruits, most surely there is a sign in this for a people who reflect."(16:10-11)

«و سخرلكم ما فى السماوات وما فى الارض
جميعاً منه. انّ فى ذلك لايات لقوم يتفكرون»
(الجاثيه/١٣)

"And He has made subservient to you whatsoever is in the heavens and whatsoever is in the earth, all, from himself; most surely there are signs in this for a people who reflect."(45:13)

On the wise:

«انّ فى خلق السماوات والارض و اختلاف الليل و
النهار و الفلك الّتى تجرى فى البحر بما ينفع الناس و ما
انزل اللّه من السماء من ماء فاحيا به الارض بعد موتها
و بثّ فيها من كلّ دابّة و تصريف الرياح و السحاب

المسخرين السماء والارض لايات لقوم يعقلون»
(البقره/۱۶۴)

``Most surely in the creation of the heavens and the earth, The alternation of the night and the day, and the ships that run in the sea with that which profits men, and the water that Allah sends down from the cloud, then gives life with it to the earth after its death and spreads in it all (kinds of) animals, and the changing of the winds and the clouds made subservient between the heaven and the earth, there are signs for a people who ponder."(2:164)

«و سخر لكم الليل و النهار و الشمس والقمر و النجوم
مسخرات بامره انّ فى ذلك لآيات لقوم يعقلون»
(النحل/۱۲)

``And He has made subservient for you the night and the day and the sun and the moon, and the stars are made subservient by His commandment; most surely there are signs in this for a people who ponder."(16:12)

On the people who understand:

«انّ فى خلق السماوات و الارض و اختلاف الليل و
النهار لآيات لاولى الالباب» (آل عمران/۱۹۰)

"Most surely in the creation of the heavens and the earth and the alternation of the night and the day there are signs for men who understand."(3:189)

الم تر ان اللّه انزل من السماء ماءً فسلکه ینابیع فی الارض ثم یخرج به زرعاً مختلفاً الوانه ثم یهیج فتریه مصفراً ثم یجعله حطاماً انّ فی ذلك لذکری لاولی الالباب» (الزمر/۲۱)

"Do you not see that Allah sends down water from the cloud, then makes it go along in the earth in springs, then brings forth therewith herbage of various colours, then it withers so that you see it becoming yellow, then makes it a thing crushed and broken into pieces? Most surely there is a reminder in this for the men of understanding."(39:21)

On the Believers:

«انّ فی السماوات والارض لآیات للمؤمنین» (الجاثیه/۳)

"Most suerly in the heavens and the earth there are some signs for the believers."(45:3)

«الم یروا انّاجعلنا اللیل لیسکنوا فیه و النهار مبصراً انّ فی ذلك لآیات لقوم یؤمنون» (النمل/۸۶)

"Do they not consider that We have made the night that they may rest therein, and the day to give light? Most surely there are signs in this for a people who believe."(27:86)

On the Pious:

«انّ فی اختلاف اللیل و النهار و ما خلق اللّه فی السماوات و الارض لآیات لقوم یتّقون» (یونس/۶)

"Most surely in the variation of the night and the day, and what Allah has created in the heavens and the earth, there are signs for a people who guard (againt) evil."(10:6)

«خذوا ما آتیناکم بقوّة واذکروا مافیه لعلّکم تتقون» (البقره/۶۳)

"Take hold of the law we have given you with firmness and bear in mind what is in it, so that you may guard (against) evil."(2:63)

On the Learned:

«ومن آیاته خلق السماوات والارض و اختلاف السنتکم و الوانکم انّ فی ذلك لآیات للعالمین» (الروم/۲۲)

"And one of His signs is the creation of the heavens and the earth and the diversity of your tongues and colours; most surely there are signs

in this for the learned."(30:22)

«هوالذی جعل الشمس ضیاءوالقمرنوراً و قدّره منازل لتعلموا عدد السنین و الحساب ماخلق اللّه ذلك الآ بالحق، یفصّل الآیات لقوم یعلمون» (یونس/۵)

"He it is who made the sun a shining brightness and the moon a light, and ordainrd for mansions that you might know the computation of years and the reckoning. Allah did not create it but in truth; He makes the signs manifest for a people who who know."(10:5)

On the Mindful:

«ما ذرأ لکم فی الارض مختلفاً الوانه ان فی ذلك لآیة لقوم یذّکّرون» (النحل/۱۳)

"And what he has created in the earth of varied hues; most surely there is a sign in this for a people who are mindful."(16:13)

«ومن کل شیء خلقنا زوجین لعلّکم تذکرون» (الذاریات/۴۹)

"And of everything we have created a pair that you may be mindful."(51:49)

On those who listen to truth:

«ومن آیاته منامکم باللیل والنهار و ابتغاؤکم من فضله انّ فی ذلك لآیات لقوم یسمعون» (الروم/۲۳)

``And one of His signs is your sleeping and your seeking of His grace by night and (by) day; most surely there are signs in this for a people who would hear."(30:23)

«واللّه انزل من السماء ماءً فاحيا به الارض بعد موتها انّ فی ذلك لآیة لقوم یسمعون» (النحل/۶۵)

``And Allah has sent down water from the cloud and there with given life to the earth after its death; most surely there is a sign in this for a people who would listen."(16:65)

On the people who are sure:

«و فی خلقكم ومایبثّ من دابّة آیات لقوم یوقنون» (الجاثیه/۴)

``And in your (own) creation and in what He spreads abroad of animals there are signs for a people that are sure."(45:4)

«وفی الارض آیات للموقنین* و فی انفسكم افلاتبصرون» (الذاریات/۲۰-۲۱)

``And in the earth there are signs for those who are sure; And in your own soul (too); will you not then see?" (51:20-21)

On those who examine truth, have insight, and understand:

«وهو الذى أنشأكم من نفس واحدة فمستقر و مستودع قد فصّلنا الآ يات لقوم يفقهون» (الانعام/٩٨)

"And He is who has brought you into being from a single soul, then there is (for you) a resting place and a depository; indeed we have made plain the signs for a people who understand."(6:98)

«فاخذتهم الصيحة مشرقين* فجعلنا عاليها سافلها و امطرنا عليهم حجارة من سجيل* انّ فى ذلك لآيات للمتوسمين» (الحجر/٧٣-٧٥)

"So the rumbling overtook them (while) entering upon the time of sunrise. Thus did we turn it upside down, and rained down upon them stones of what has been decreed. Surely in this are signs for those who examine."(15:73-75)

«كلوا وارعوا أنعامكم انّ فى ذلك لآيات لاولى النهى» (طه/٥۴)

"Eat and pasture you cattle; most surely there are signs in this for those endowed with understanding."(20:54)

What we understand from the words: *tafakkur,*

taaqqul, tafaqquh, etc. "used in the Quran is that they refer to different degrees of intellectual perception and some degrees are indispensible for some other degrees. For example, by comparing the following verses:

«ان فی خلق السماوات والارض و اختلاف اللیل و النهار لآیات لاولی الالباب الذین یذکرون الله قیاما و قعودا و علی جنوبهم و یتفکّرون فی خلق السماوات والارض ربنا ما خلقت هذا باطلا...» (آل‌عمران / ۱۹۰-۱۹۱)

``Most surely in the creation of the heavens and the earth and the alternation of the night and the day there are signs for men who understand. Those who remember Allah standing and sitting and being on their sides and reflect on the creation of the heavens and the earth: our Lord! Thou hast not created this in vain. Glory be to thee; save us then from the chastisement of the fire!"(3:190-191)

«انّ فی خلق السماوات والارض و اختلاف اللیل و النهار ... لآیات لقوم یعقلون» (البقره / ۱۶۴)

``Most surly in the creation of the heavens and the earth and the alternation of the night and the day...there are signs for a people who

understand."(2:164)

«انّ فی اختلاف اللیل و النهار و ما خلق اللّه فی السماوات و الارض لآ یات لقوم یتقّون» (یونس/۶)

"Most surely in the alternation of the night and the day, and what allah has created in the heavens and earth, there are signs for a people who guard (against evil)."(10:6)

«...وتزودوا فان خیرالزاد التقوی واتقون یا اولی الالباب» (البقره/۱۹۷)

"...and make provision, for surely the provision is the guarding of oneself, and be careful (of your duty) to Me, O men of understanding."(2:197)

«و تلك الامثال نضربها للناس و ما یعقلها الاّ العالمون» (العنکبوت/۴۳)

"And (as for) these examples, We set them forth for the people and none understand them but the learned."(29:43)

It may be concluded that *`Ulel-Albāb* (possessors of "reasoning faculty", meditation, piety and knowledge. Their other characteristics are listening and hearing the right word, ability of avoiding fallacies or illusions, worshipping God, having wisdom, being mindful and taking an example of the past experiences (of

ancestors). These characteristics are deducible from the following verses:

«... فبشر عباد* الذين يستمعون القول فيتبعون احسنه اولئك الذين هدیٰهم اللّه و اولئك هم اولواالالباب» (الزمر/١٧-١٨)

"Those who listen to the word, then follow the best of it those are they whom Allah has guided, and those it is who are the men of understanding."(39:18)

«هوالذی انزل علیك الكتاب منه آیات محكمات هن أم‌الكتاب و اخر متشابهات فامّا الذین فی قلوبهم زیغ فیتّبعون ما تشابه منه ابتغاء تأویله و مایعلم تأویله الاّ اللّه و الراسخون فی العلم یقولون آمنّا به كل من عند ربّنا و ما یذكر الاّ اولواالالباب» (آل‌عمران/٧)

"He it is who has revealed the book to you; some of its verses are decisive, they are the dasis of the Book, and others are allegorical; then as for those in whose hearts there is perversity, they follow the part of it which is all allegorical, seeking to mislead, and seeking to give it (their own) interpetation, but none knows its interpretation except Allah, and those who are firmly rooted in knowledge say: we believe in it, it is all from our Lord; and none do mind

except those having understanding."(3:7)

«أمّن هو قانت آناء الليل ساجداً و قائماً يحذرالآخرة و يرجوا رحمة ربّه قل هل يستوى الذين يعلمون والذين لايعلمون انّما يتذكرّ اولواالالباب»(الزمر/٩)

"What! He who is obedient during hours of the night prostrating himself and standing, takes care of the Hereafter and hopes for the mency of his Lord! Say: 'Are those who know and those who do not know alike?' Only the men of understanding are mindful."(39:9)

«يؤتى الحكمة من يشاء و من يؤت الحكمة فقد اوتى خيراًكثيرا و ما يذكّر الاّ اولواالالباب» (البقره/٢٦٩)

"He grants wisdom to whom He pleases, and whoever is granted wisdom, he indeed is given a great good, and none but men of understanding mind."(2:269)

«الم تر ان اللّه انزل من السماء ماءً فسلكه ينابيع فى الارض ثم يخرج به زرعاً مختلفاً الوانه ثم يهيج فترنه مصفراً ثم يجعله حطاماً انّ فى ذلك لذكرى لاولى الالباب» (الزمر/٢١)

"Do you not see that Allah sends down water from the cloud, then makes it go along in the earth in springs, then brings forth there with herbage of colours, then it withers so that you

see it becoming yellow, then He makes it a thing crushed and broken into pieces? Most surely there is a reminder in this for the men of understanding."(39:21)

«لقد كان فی قصصهم عبرة لاولی الالباب...»
(یوسف/۱۱۱)

``In their historis there is certainly a lesson for men of understanding."(12:111)

One can see that *`Ulul-Albāb* possess most of the characteristics mentioned in the Quran for understanding nature. They have purified intellects, and, therefore, have better capability for attaining a deeper knowledge of nature.

Also from the comparison of the following verses:

«و هوالذی جعل لکم النجوم لتهتدوا بها فی ظلمات البّر و البحر قد فصّلنا الآیات لقوم یعلمون»
(الانعام/۹۷)

``And He it is who made the stars for you that you might follow the right way thereby in the dakness of the land and the sea; truely we have made plain the signs for people who know."(6:97)

«و هوالذی أنشأکم من نفس واحدة فمستقر و مستودع قد فصّلنا الآیات لقوم یفقهون» (الانعام/۹۸)

"And He it is who has brought you into being from a single soul, then there is (for you) a resting-place and a depository; indeed we have made plain the signs for a people who understand."(6:98)

«و هوالذی انزل من السماء ماء فاخرجنا به نبات کل شیء فاخرجنا منه خضراً نخرج منه حبّا متراکباً و من النخل من طلعها قنوان دانیة و جنات من اعناب و الزیتون والرّمّان مشتبهاً و غیرمتشابه انظروا الی ثمره اذا اثمر و ینعه انّ فی ذلکم لآیات لقوم یؤمنون» (الانعام/۹۹)

"And He it is who sends down water from the cloud, then We bring forth with it buds of all (plants), then we bring forth from it green (foliage) from which we produce grain piled up; and of the palm tree, of the sheaths of it, come forth clusters (of dates) within reach,... most surely there are signs in this for a people who believe." (6:99)

we realise (as Allāmah **Tabātabaī** has mentioned [30]) that while understanding certain things related to plants is possible for unlearned believers, the understanding of astronomical problems requires scientific background, and the understanding of issues

related to the human soul and its mysteries needs theoretical knowledge as well as profound understanding of human nature. The Quran refers to a sublime faculty of cognition which is the cognition of the `spiritual dimension' (*malakūt*) of the heavens and the earth:

«وكذلك نرى ابراهيم ملكوت السماوات والارض وليكون من الموقنين» (الانعام/٧٥)

``And thus did We show `Ibrāhīm the spiritual dimension of the heavens and the earth, and that he might be of those who are sure."(6:75)

«اولم ينظروا فى ملكوت السماوات والارض و ما خلق الله من شيء...» (الاعراف/١٨٥)

``Do they not consider the spiritual dimension of the heavens and the earth and whatever things Allah has created?"(7:185)

Moreover, the first verse indicates that the vision of `spiriual dimension' results in sureness. There have been various intepretarions of *malakūt* Some scholars, including Allāmah **Tabātabāī**[31], believe it to be the innermost aspect of beings and the deepest attachment of their very existence to the Almighty God. Some mean by it wonders in the heavens and the earth [32], and some others intepret it as the laws of nature. [33]

In reference to the vision of `Malakūt', various views have been expressed. The majority of the interpreters believe it to be a non-sensual vision or an intellectual one[34]. **Fakhr al-Dīn Rāzī** in his interpretation of the first verse (i.e.6:75) says:

> *``There are two views in connection with the `revealing': The First view indicates that God revealed the spiritual dimension to Ibrāhim's ordinary eyes... and the second indicates that it was his inner and mental discernment that had this vision, not his physical eyes. These things prove that the vision had been through mental discernment not through the eyes.''*[35]

It is quite certainly a profound cognition of nature; and as it ends in certitude and sureness, it is the highest level of cognition. But to attain this kind of cognition, one requires all the qualities mentioned in the verses quoted in this section.

Thus, we conclude that:

1- There are different levels for the understanding of a phenomenon.

2- For understanding different natural phenomena, there are different pre-requisite conditions.

3- To have a more profound understanding of

nature, resrarchers should try to acquire the above-mentioned characteristics more and more. These characteristics can be briefly summarized in the following three categories: scientific aptitude, higher (analytical) intellect, and faith with piety.

One may question the role of faith and piety in the proper understading of nature, asking for what reason has God denied the proper cognition to unbelievers in the following verses:

«قل انظروا ما ذا فی السماوات والارض و ماتغنی الایات و النذرعن قوم لایؤمنون» (یونس/۱۰۱)

"Say consider what is that is in the heavens and the earth; and signs and warners do not avail a people who would not believe."(10:101)

«اولم یروا الی الارض کم انبتنا فیها من کل زوج کریم* انّ فی ذلك لآیة و ما کان اکثرهم مؤمنین» (الشعراء/۷-۸)

"Do they not see the earth, how many of every noble kind we have caused to grow in it? Most surely there is a sign in that, but most of them will not believe."(26:7-8)

«و ما انت بهادالعمی عن ضلالتهم ان تسمع الا من یؤمن بآیاتنا فهم مسلمون» (الروم/۵۳)

"Nor can you lead away the blind out of their

way. You cannot make to hear any but those who believe in our signs..."(30:53)

Why has God attributed the understanding of some of his signs in nature to the believers and the pious only?

«انّ فــی الســماوات والارض لآیــات للــمؤمنین» (الجاثیة/۳)

"Most surely in the heavens and the earth there are some signs for the believers."(45:3)

«انّ فــی اخــتلاف اللـیل و النـهار و مـاخلق اللّـه فــی السماوات و الارض لآ یات لقوم یتقون» (یونس/۶)

"Most surely in the alternation of the night and the day and what Allah has created in the heavens and the earth, there are signs for a people who guard (against) evil."(10:6)

Is it not true that every person whether believer or nonö believer many be capable of logical thinking? Isn't the Quran itself logically arguing with unbelievers and polytheists. To answer this question we seek help from the Quran itself. In view of the inseparsbility of piety and faith:

«...واتقوا اللّه ان کنتم مؤمنین» (المائده/۵۷)

"And be careful of (your duty to) God if you are believers."(5:57)

«ان تتقوا الله يجعل لكم فرقانا...» (الانفال/۲۹)

one can point out that, as an effect of faith, man can differentiate between right and wrong, for his intellectual activity is free from the vices caused by devilish inducements and temptations. As Jalāl al-Dīn Rūmī puts it:

آینه دل چون شود صافی وپاک
نقشها بینی برون از آب و خاک
هم ببینی نقش وهم نقاش را
فرش دولت را وهم فرّاش را

``When the mirror of heart gets clean and stainless, Therein you see images beyond earth and water, You see both the painter and the paintings, Both the Divine carpet and the carpet spreader."

or as **Hāfiz** puts it:

چشم آلوده نظر از رخ جانان دوراست
بر رخ او نظر از آینهٔ پاک انداز
غسل دراشک زدم کاهل طریقت گویند
پاک شو اوّل و پس دیده برآن پاک انداز

``The blurred eye cannot reach the face of the beloved, Cast your look upon her when your mirror is clean, I rinsed my eyes clean with my own tears, as the visionaries say, `First clean

yourself and then look upon the clean'."

In his exegsis of the Quran, *al-Mīzān*, ``Allāmah **Tabātabā'ī** says:

``The reason why the Holy Quran emphasizes piety alongside reflection, intellection and remembrance, and has related knowledge with practice is that it ensures the stability of thought, righteousness of knowledge and avoidance of vices of caprice and evil."[36]

A saying from our great **Prophet** (SA) has been reported, which confirms this.

«لولا ان الشياطين يحومون على قلوب بنى آدم لنظروا الى ملكوت السماء»

``Had the party of devil not moved around the minds of the children of Adam, they would have seen the spiritual dimension of the sky."[37]

There is also a statement from Imām **`Alī** (AS) on the same line[38]:

«و من لم يهذّب نفسه لم ينتفع بالعقل»

``One who does not render his heart clean does not benefit from his intellect."

Therefore, the important role of piety and cleanness of heart (sanctification) is to harness the slips of intellect. However, we deduct from certain

Quranic verses and Islamic traditions that the effect of piety is not limited to the repulsion of the impediments of cognition; but through piety and sanctification one can attain cognition above and beyond the cognition attained through experience and reasoning. In this connection, we are going to cite some relevant verses from the Quran:

«...واتقواالله و يعلّمكم الله...» (البقره/۲۸۲)

``...and be careful of (your duty to) Allah and Allah teaches you..."(2:282)

«والذيـــن جــــاهدوا فـــينا لنــهدينهم ســـبلنا...» (العنكبوت/۶۹)

``And (as for) those who strive hard for Us, We will most certainly guide them in Our ways..."(29:69)

«وكذلك نرى ابراهـيم مـلكوت الســماوات والارض وليكون من الموقنين» (الانعام/۷۵)

``And thus did We show Ibrahim the spiritual dimension (Malakut) of the heavens and the earth, so that he might be of those who are sure."(6:75)

A tradition of the **Prophet Muhammad** (SA), which is universally accepted and respected by all Muslims, says:

«قال رسول اللّه(ص): قال اللّه عزوجل... وما تقرب الى عبد بشيء احب الى مما افترضت عليه وانه ليتقرب الى بالنافلة حتى احبه فـاذا احببته كـنت سـمعه الذى يسمع به و بصره الذى يبصربه ولسـانه الذى يـنطق به و يـده التـى يـبطش بـها ان دعـانى اجـبته وان سألنـى اعطيته» ٣٩

"No servant has sought My proximity through what is more favourite to Me than performing his duties; but through praiseworthy acts a servant gets so close to Me that I love him. It is then that I become an ear for him by means of which he hears, an eye for him by means of which he sees, a tongue for him by means of which he speaks and a hand with which he grasps. Should he call Me, I respond to him; and should he request something, I bestow upon him."[39]

It has also been reported that our great **Prophet** (SA) had said:

«ما اخلص عبد للّه عزوجل اربعين صـباحا الآ جـرت ينابيع الحكمة من قلبه على لسانه»

"No servant devotes his full forty mornings to (the service of) God except when the springs of wisdom flow from his heart to his tongue."[40]

and it is reported from Imām `Alī (AS) in *Nahj al-Balāghah*:

قداحيا عقله وامات نفسه حتى دق جليله ولطف غليظه و برق له لامع كثيرالبرق فـابان له الطـريق وسـلك بـه الســبيل، و تــدافــعته الابـواب الى بـاب الســلامة و دارالاقامة و ثبتت رجلاه بطمانينة بدنه فى قرار الامن و الراحة، بما استعمل قلبه، وارضى ربه»

``He (the believer) kept his mind alive and killed (the desires of) his heart till his body became thin, his bulk turned light and effulgence of extreme brightness shone for him. It lighted the way for him and took him on the (right) path. Different doors led him to the door of safety and the place of (his permanent) stay. His feet, balancing his body, got fixed in the position of safety and comfort because he kept his heart busy (in good acts) and pleased his Allah."[41]

Also in *Nahj al-Balāghah* we find:

«هجم بهم العلم على حـقيقة البـصيرة و بـاشروا روح اليقين و اسـتلانوا مـا اسـتعوره المـترفون و انسـوابـما استوحش عنه الجاهلون»

``Knowledge has led them to real understanding and so they have associated themselves with the spirit of conviction. They take easy what the

easy-going regard as hard. They love what the ignorant took as awful."[42]

In any case, it is certain that illumination and inspiration, as a source of knowledge is not open to all, and only those with proper background can benfit from it. The channel which is open to all is the employment of sensory experience and intellect; and, of course, in order to arrive at truth one should avoid the impediments in the way of cognition.

VI. Impediments of Cognition

Sometimes, certain internal factors overrule the intellect, and prevent it from functioning propely. Then, while the judgements are said to have been made wisely, in fact they are the product of an unhealthy intellect polluted with impurities. As Allāmah **Tabātabā'ī** puts it:

> *"The role of intellect in such cases resembles that of a judge who passes an unjust verdict relyingon (forged) documents or false witnesses, though he may not have intended to do so."*[43]

Therefore, a researcher should shake his mind of unfounded prejudgements and suppositions, and cleanse it of immoralities, in order to attain a correct

understanding. **al-Ghazzālī** in his book "*Ihyā `Ulūm al-Dīn*" uses an interesting simile[44], which, in some respects casts light on this subject. He says that the human heart resembles a mirror which reflects good , clear pictures when it is shined and polished. The human heart, too, becomes more shining through noble qualities, and better reflects truth and realities; but when it is affected by vicious qualities, like a dust-covered mirror, it cannot depict realities. For the same reason, "not hearing" has connection with "the sealing of the heart" on account of faulty deeds as shown in the following verses of the Holy Quran:

«...لونشاء أصبناهم بذنوبهم و نطبع على قلوبهم فهم لايسمعون» (الاعراف/١٠٠)

"If We please, We would afflict them on account of their faults, and set a seal on their hearts so they would not hear."(7:100)

«واتقواالله واسمعوا...» (المائده/١٠٨)

"...And be careful of (your duty to) God and hear..."(5:108)

Thus, listening to, and hearing the right word is connected with piety; and not hearing it, or sealing the heart, is connected with committing sins. **al-Ghazzālī** goes on with his simile and says:

For everything known there is a truth, a picture of which falls on the mirror of heart, which is the home of knowledge. Now, in the same way that an ordinary mirror cannot reflect an image because of any one of the following defects:

1- imperfect components

2- opacity of the face of the mirror

3- not facing the bright side of the mirror

4- the existence of a barrier between the mirror and the object

5- the object not being placed in front of the mirror.

A human heart, which is capable of understanding realities, may have that capacity affected by one of the following five causes:

1- intrinsic deficiency, as in the case of children

2- obscurity (darkness) caused by sins and lust

Therefore, turning one's face towards the Creator, and turning away from passions purifies the heart and makes it glitter:

«والذيـــن جـــاهدوا فـــينا لنـــهدينهم ســبلنا...»

(العنكبوت/۶۹)

"Those who strive hard for us We will most certainly guide them in our ways..."(29:69)

3- Not paying attention to realities

A heart may be clean, but if it does not search for truth, the truth is not revealed to it. For instance, a man whose sole endeavour is physical worship or earning his livelihood, without any meditation on the Divine realities hidden from common man's eyes, may get only what he is after, not more.

4- The existence of obstacles in the way of cognizing realities, i.e. veils and barriers between the heart and the object in view, prevents access to the truth. Blind imitation of the ancestors and the sedimented opinions of one's own are hindrances to the perception of realities.

5- Ignorance of the method of attining the object in view.

A man in search of knowledge cannot succeed to do so unless he is provided with the prerequisites for attaining the desired reality. Therefore, ignotance of these prerequisites and their manner of combination is an impediment in the way of attaining knowledge. For instance a man who wants to see the back of his head, but holds the mirror in front of him, cannot see what he wants; if he holds the mirror behind his head, he cannot see even the mirror, much less his back. Thus

he needs two mirrors to achieve his purpose, and the two mirrors should be set in a special position in relation to each other. The same holds for cognition. For every cognition, its prerequisites should be attained first. Ignorance creates the impediments between the heart and realities. Otherwise, the heart is intrinsically noble and capable of attaining realities (this is a brief summary of al-Ghazzālī's views on the matter).

Now we are going to cite from the Holy Quran the factors which prevent a correct cognition. These factors can be classifid under two or three general headings, but for the sake of clarity of the matter, we use the very headings mentioned in the verses of the Quran.

1- Lack of faith

There are many verses in the Quran which indicate faithlessness as a great impediment in the way of cognition:

«ذلك بأنّهم آمنوا ثم كفروا فطبع الله على قلوبهم فهم لايفقهون» (المنافقون/٣)

"That is because they believe, then disbelieve, so a seal is set upon their hearts so that they do

not understand." (63:3)

«وما انت بهادالعمى عن ضلالتهم ان تسمع الآ من يؤمن بآياتنا فهم مسلمون» (الروم/۵۳)

``Nor can you lead away the blind out of their error. You cannot make to hear any but those who believe in our signs so they shall submit."(30:53)

«...كذلك يجعل اللّه الرجس على الّذين لايـؤمنون» (الانعام/۱۲۵)

``...Thus does God lay uncleanness on those who do not believe."(6:125)

«... انّـا جـعلنا الشـياطين اوليـاء الّـذين لايـؤمنون» (الاعراف/۲۷)

``Surly we have made the Shaitans to be guardians of those who do not believe,"(7:27)

«انّ الذين لايؤمنون بآيـات اللّـه لايـهديهم اللّـه...» (النحل/۱۰۴)

``(As for) those who do not believe in God's signs, surely God will not guide them."(16:104)

«... والذين لايؤمنون فـى آذانـهم وقـر و هـو عـليهم عمىً...» (فصلّت/۴۴)

``...and (as for) those who do not believe, there is a heaviness in their ears and it is obscure to them."(41:44)

Some verses in the Quran indicate that the sole reliance on knowledge, without faith, can never take one to the correct understanding of nature:

«قل انظروا ماذا فی السماوات و الارض و مـا تـغنی الآیات و النذرعن قوم لایؤمنون» (یونس/۱۰۱)

``Say: consider what is it that is in the heavens and the earth; and signs and warners do not avail a people who would not believe."(10:101)

«فاعرض عن من تولّی عن ذکرنا و لم یرد الاّ الحیوة الدنیا* ذلك مبلغهم من العلم انّ ربكّ هواعلم بمن ضلّ عن سبیله و هو اعلم بمن اهتدی» (النجم/۲۹-۳۰)

``Therefore, turn aside form him who turns his back upon Our reminder and does not desire anything but this world's life. That is their goal of knowledge; and He knows best him who follows the right direction."(53:29-30)

As previously mentioned, the principal role of faith in understanding is to restore man's faculty of intellect to its original state.

2- The existence of the factors causing intellect's deviation

The existence of certain characteristics and qualities in some people prevents them from exercizing sound

judgement in discovering the truth. Here are some important ones:

a- Following one's desires, fancies and wishes

It is repeatedly mentioned in the Quran that following one's desires and wishes leads one astray:

«فان لم يستجيبوا لك فاعلم انّما يتبعون اهوائهم ومن اضــل مــمن اتــبع هــويه بـغير هـدى مـن اللّـه...»
(القصص/٥٠)

"But if they do not answer you, know that they only follow their low desires: and who is more erring than he who follows his low desires without any guidance from Allah." (28:50)

«افرأيت من اتخذ الهه هويه واضـلّه اللّـه عـلى عـلم وختم على سمعه و قلبه و جعل على بصره غشاوة فمن يهديه من بعداللّه افلاتذكرون» (الجاثية/٢٣)

"Have you then considered him who takes his low desire for his God, and Allah has made him err, having knowledge, and has set a seal upon his ear and his heart and put a covering upon his eye. Who can then guide him after Allah? Will you not then be mindful?"(45:23)

«...ولئن اتبعت أهواء هم بعدالذى جاءك مـن العـلم مالك من اللّه من ولى ولانصير» (البقرة/١٢٠)

"And if you follow their desires after the knowledge that has come to you, you shall have no guardian from Allah, nor any helper."(2:120)

«...فاحكم بين الناس بالحق و لاتتبع الهوى فيضلك عن سبيل اللّه...» (ص/٢۶)

"...so judge between men with justice, and do not follow desire, lest it should lead you astray from the path of Allah." (38:26)

«... و ان كثيراً ليضلّون باهوائهم بغير علم...» (الانعام/١١٩)

"...and most surely many would lead (people) astray by their low desires out of ignorance..." (6:119)

«اولئك الذين طبع على قلوبهم واتبعوا أهواءهم» (محمد/١۶)

"And these are they upon whose hearts God has set a seal and they follow their low desires." (47:16)

Our great **Prophet** (SA) has been quoted as saying:

«ان اخوف ما اخاف على امّتى الهوى و طول الامل، امّا الهوى فانّه يصّد عن الحق، و امّا طول الامل فينسى الآخرة».

"In your case I would fear of two

> *characteristics: obedeince to desires and indulgence. Obedience to desires and fancies keeps you away from finding truth, and indulgence causes you to forget the Hereafter.'*[45]

and it has been reported from Imām 'Alī (AS) as saying:

> «الهوى عدوّ العقل»
>
> *"Desire is the enemy of reason."*[46]

and

> «الاماني تعمى اعين البصائر»
>
> *"Ambition blinds man's insight.'*[47]

b- Blind love or hatred and unjustifiable prejudices

These, too, are the factors which prevent the intellect from impartiality and seeking truth. As an Arab poet said:

> و عين الرضا عن كل عيب كلية
>
> و لكن عين السخط تبدى المساويا
>
> *"A look with satisfied eyes covers all the faults, but a look of discontent uncovres all the faults."*

or as the Persian poet **Jalāl al-Dīn Rūmī** puts it:

چون غرض آمد هنر پوشیده شد

صد هزاران دل بسوی دیده شد

``When bias comes, art is covered

A hundred veils move from heart to (cover) the eyes."

The Holy Quran has repeatedly warned man against the diseases which inflict the heart:

«و امّا ثمود فهد يناهم فاستحبوا العمى على الهدى فاخذتهم صاعقة العذاب الهون بما كانوا يكسبون» (فصلت/۱۷)

``And as to Thamūd, we showed them the right way, but they chose error above guidance, so there overtook them the scourge of an abasing chatisement for what they earned." (41:17)

«و عاداً و ثمود و قد تبيّن لكم من مساكنهم و زيّن لهم الشيطان اعمالهم، فصدّهم عن السبيل و كانوا مستبصرين» (العنكبوت/۳۸)

``And (we destroyed) `Ād and Thamūd and from their dwellings (this) is apparent to you indeed; and the Shaytān (Satan) made their deeds fair seeming to them, so he kept them back from their path, though they were endowed with intelligence and skill."(29:38)

«... و قال يا قوم لقد ابلغتكم رسالة ربّى و نصحت لكم

و لکن لا تحبّون الناصحین» (الاعراف/۷۹)

``Then said: O my people I did cerainly deliver to you the message of my Lord, and I gave you good advice, but you do not love those who give good advice."(7:79)

«ذلك بانّهم استحبوا الحیوة الدنیا علی الآخرة و انّ اللّه لا یهدی القوم الکافرین* اولئك الذین طبع اللّه علی قلوبهم و سمعهم و ابصارهم و اولئك هـم الغـافلون» (النحل/۱۰۷ـ۱۰۸)

``This is because they have this world's life more than the Hereafter, and because Allah does not guide the unbelieving people. These are they on whose hearts and their hearing and their eyes Allah has set a seal, and these are the heedless ones." (16:107ö108)

«لقد جئناکم بالحق و لکن اکـثرکم للـحق کـارهون» (الزخرف/۷۸)

``Certainly we have brought you the truth but most of you are adverse to the truth." (43:78)

«ذلك بـانهم کـرهوا مـا انـزل اللّـه فـاحبط اعـمالهم» (محمد/۹)

`` That is because they hated what God revealed. So He rendered their deed null."(47:9)

«... و زین ذلك فی قلوبکم و ظننتم ظنّ السوء و کنتم

قوماً بوراً» (الفتح/١٢)

``...and that was made fairseeming to your hearts and you thought an evil thought and you were a people to perish." (48:12)

«و قال نسوة في المدينة امرأة العزيز تراود فتاها عن نفسه قد شغفها حبّا انّا لنراها في ضلال مبين» (يوسف/٣٠)

``And women in the city said: ``The chief's wife seeks her slave to yield himself (to her), surely he has affected her deeply with (his) love, most surely we see her in manifest error." (12:30)

«... وكذلك زين لفرعون سوء عمله و صدّ عن السبيل...» (غافر/٣٧)

``And thus the evil of his deed was made fairseeming to Pharaoh, and he was turned away from the way..." (40:37)

It has been quoted from the great **Prophet**(SA):

«حبّك للشيء يعمي و يصم»

``Loving something makes you blind and deaf (in relation to it)."[48]

And it has been quoted from Imām **`Alī** (AS):

«و من عشق شيئاً اعشى بصره و امرض قلبه فهو ينظر بعين غير صحيحة و يسمع باذن غير سميعة»

``A lover is blind and sick at heart, so he face

the truth with unhealthy sight and a deaf ear.'[49]

and:

«انّ القلب اذاكره عمى»

``Heart turns blind to what it dislikes."[50]

c- Pomposity

It happens so often that a person (though aware of the fact) does not accept the truth. The Quran warns this group of people of God's severe punishment:

«يسمع آيات اللّه تتلى عليه ثم يصرّ مستكبراً كان لم يسمعها فبشّره بعذاب اليم* و اذا علم من آياتنا شيئاً اتخذهاهزواً اولئك لهم عذاب مهين» (الجاثيه / ٨ـ٩)

``Who hears the communications of Allah recited to him, then persists proudly as though he has not heard them! So announce to him a painful punishment. And when he comes to know of any of Our communication, he takes it for a jest; these it is that shall have abasing chastisement." (45:8-9)

«فلما جاءتهم اياتنا مبصرة قالوا هذا سحرمبين* و جحدوا بها واستيقنتها انفسهم ظلماًو علواً فانظر كيف كان عاقبة المفسدين» (النمل/١٣-١٤)

``So when Our clear signs came to them, they

said: this is clear enchantment, and they denied them unjustly and proudly while their soul had been convinced of them: consider, then how was the end of the mischief-makers." (27:13-14)

«...فما اغنى عنهم سمعهم و لا ابصارهم و لاافئدتهم من شيء اذ كانوا يحجدون بايات الله و حاق بهم ما كانوا به يستهزؤن» (الاحقاف/۲۶)

``But neither their ears nor their eyes, nor their hearts availed them anything since they denied the signs of God, and that which they mocked encompassed them."(46:26)

«انّ الذين كذّبوا باياتنا واستكبروا عنها لا تفتح لهم ابواب السماء...» (الاعراف/۴۰)

``Surely(as for) those who reject Our signs and turn away from them haughtily, the doors of heaven shall not be opened for them." (7:40)

«و انّي كلّما دعوتهم لتغفرلهم جعلوا اصابعهم في اذانهم و استغشوا ثيابهم واصرّوا واستكبروا استكباراً» (نوح/۷)

``And whenever I have called them that Thou mayest forgive them, they put their fingers in their ears, cover themselves with their garments, and persist and are puffed up with pride." (71:17)

«ثم ادبر واستكبر * فقال ان هذا الا سحر يؤثر»
(المدثر/۲۳ـ۲۴)

"Then he turned back and was big with pride. Then he said: 'This is naught but enchantment narrated'." (74:23-24)

It is quoted from our **Prophet** (SA) who said:

«يا علی ثلاث درجات و ثلاث كفارات و ثلاث منجيات... و امّا المهلكات فشح مطاع و هوی متبع و اعجاب المرء بنفسه».

"O, 'Ali, people perish because of three characteristics:

jealousy, (carnal) desire, and egoism."[51]

and it has been reported from Imām 'Alī (AS) who said:

«العجب يفسد العقل»

"Egoism corrupts intellect.'[52]

d- Blind imitation of the ancestors' opinions, men of authority, and the sediments of one's own thoughts

These, too, are characteristics which put barriers in the way of seeking the truth, and are repeatedly condemned in the Quran:

«قالوا ربّنا انا اطعنا سادتنا وكبرائنا فاضلونا السبيلاً»
(الاحزاب/۶۷)

"And they shall say: O our Lord, Surely we obeyed our leaders and our great men, so they led us astray from the path."(33:67)

«... بل نتبع ما الفينا عليه ابائنا او لو كان اباؤهم لا يعقلون شيئاً و لا يهتدون» (البقرة/١٧٠)

"Nay, we follow what we found our fathers upon. What, and though their fathers had no sense at all, nor did they follow the right way." (2:170)

«فلما جاءتهم رسلهم بالبينات فرحوا بما عندهم من العلم و حاق بهم ماكانوا به يستهزءون» (المؤمن/٨٣)

"Then when their messengers came to them with clear arguments, they exulted in what they had with them of knowledge, and there beset them that which they used to mock." (40:83)

«و اذا قيل لهم تعالوا الى ما انزل اللّه و الى الرسول قالوا حسبنا ما وجدنا عليه ابائنا او لو كان اباؤهم لا يعلمون شيئاً و لا يهتدون» (المائده/١٠۴)

"And when it is said to them: follow what Allah has revealed and this messenger, they say: 'Nay! We follow what we find our fathers upon. What! and though their fathers had no sense at all, nor did they follow the right way." (5:104)

«و تلك عاد جحدوا بآيات ربّهم و عصوا رسله واتبعوا

امر كل جبّار عنيد» (هود/ ۵۹)

"And this was 'Ād: they denied the signs of their Lord, and disobeyed His messengers and followed the bidding of every insolent opposer (of truth)." (11:59)

«... فاتبعوا أمر فرعون و ما أمر فرعون برشيد» (هود/۹۷)

"...but they followed the bidding of Pharaoh, and Pharaoh's bidding was not right-directing." (11:97)

e- Haste in judgements

Haste often is the cause of carelessness and error in understanding the trurh. That is why the Quran has warned us against it:

«خلق الانسان من عجل سأوريكم آياتى فلا تستعجلون» (الانبياء/۳۷)

"Man is created of haste; now will I show to you my signs, therefore, do not ask Me to hasten (them) on." (21: 37)

«يا ايهاالذين امنوا ان جاءكم فاسق بنبأ فتبيّنوا ان تصيبوا قوماً بجهالة فتصبحوا على مافعلتم نادمين» (الحجرات/۶)

"O you who believe! if an evil-doer comes to

you with a report look carefully into it, lest you harm a people in ignorance, then be sorry for what you have done." (49:6)

It has been quoted from our **Prophet** (SA) who said:

«الأناة من اللّه والعجلة من الشيطان»

"Haste is the deed of Shaytān and tranquility is from Allah."[53]

and Imām **`Alī** (AS) has been quoted as saying:

«العجلة تمنع الاصابة»

"Haste hinders one from reaching righteousness and rectitude."[54]

3- Ignorance

Most of the errors in judgements (whether scientific or non- scientific) originate from ignorance of the subject and lack of enough knowledge about it.

In the Quran, there are a good number of verses in which ignorance has been condemned:

«قال ربّ انی اعوذبك ان اسئلك ما لیس لی به علم...»

(هود/۴۷)

"He said: `My Lord! I seek refuge in Thee from asking Thee that of which I have no knowledge'." (11:47)

«... فلم تحاجّون فیما لیس لکم به علم...»

(آل‌عمران/۶۶)

``...why then do you dispute about that of which you have no knowledge?" (3:66)

«... و ان‌کثیراً لیضلّون باهوائهم بغیر علم...»
(الانعام/۱۱۹)

`` And most surely many would lead (people) astray to their low desires out of ignorance..." (6:119)

«و من الناس من یجادل فی اللّه بغیر علم و لا هدی و لا کتاب منیر» (الحج/۸)

`` And among men there is he who disputes about Allah without knowledge and without guidance and without an illuminating book."(22:8)

«... و ابلغکم ما أرسلت به و لکنی اریکم قوماً تجهلون» (الاحقاف/۲۳)

``...and I deliver to you the message with which I am sent but I see you are a people who are ignorant." (46:23)

our great **Prophet** (SA) is reported as saying:

«من افتی الناس بغیر علم لعنته ملائکة السماوات و الارض»

`` The angels in the heavens and the earth curse the person who passes judgement without

knowledge."[55]

Among the evident examples of ignorant judgements, one may include subjection to conjecture, unfounded confirmations or rejections, and superficial consideration of events and phenomena.

a- Subjection to conjecture

In the Quran we have been repeatesdly warned against subjection to conjecture and sacrificing knowledge to supposition:

«و قالوا ماهی الاحیاتنا الدنیا نموت و نحیا و ما یهلکنا الّا الدهر و ما لهم بذلك من علم ان هم الّا یظنّون» الجاثیة / ۲۴)

"They say: there is nothing but our life in this world; we live and die and nothing destroys us but time, and they have no knowledge of that; they only conjecture." (45:24)

«و ما لهم به من علم ان یتبعون الّا الظّن و انّ الظّن لا یغنی من الحق شیئاً» (النجم/۲۸)

"And they have no knowledge of it; they do not follow anything but conjecture, and surely conjecture does not avail against the truth at all." (53:28)

«و ما یتّبع اکثرهم الّا ظنّاً انّ الظنّ لا یغنی من الحق

شيئاً...» (یونس/۳۶)

"And most of them do not follow (anything) but conjecture; surely conjecsture will not avail against the truth." (10:36)

b- Unfounded confirmations and rejections

The glorious Quran encourages us to follow reason and avoid unfounded confirmations:

«... قل هل عندكم من علم فتخرجوه لنا ان تتبعون الّا الظنّ و ان انتم الّا تخرصون» (الانعام/۱۴۸)

"Say: 'Have you any knowledge with you so you should bring it forth to us? You only follow a conjecture and you only tell lies.' " (6:148)

«و قالوا لن يدخل الجنة الّا من كان هوداً اونصارى تلك امانيهم قل هاتوا برهانكم ان كنتم صادقين» (البقره/۱۱۱)

"And they said: None shall enter the garden (of paradise) except he who is a Jew or a Christian. These are their vain desires. Say: Bring your proof if you are truthful." (2:111)

«قل أرأيتم ما تدعون من دون اللّه اروني ماذا خلقوا من الارض ام لهم شرك فى السماوات ائتونى بكتاب من قبل هذا او أثارةٍ من علم ان كنتم صادقين» (الاحقاف/۴)

"Say: 'Have you considered what you call upon besides Allah? Show me what they have created of the earth, or have they a share in the heavens? Bring me a book (revealed) before this or traces of knowledge, if you are truthful.' " (46:4)

«ان الذين يجادلون فى ايات اللّه بغير سلطان اتيهم، ان فى صدورهم الّاكبر ما هم ببالغيه، فاستعذ باللّه انّه هو السميع البصير» (غافر/۵۶)

"Surely (as for) those who dispute about the signs of Allah without any authority that has come to them, there is naught in their breast but (a desire) to become great which they never attain to; therefore, seek refuge in Allah, surely He is the hearing, the seeing." (40:56)

««و لا تقف ما ليس لك به علم ان السمع والبصر والفؤاد كل اولئك كان عنه مسئولاً» (الاسراء/۳۶)

"And follow not that of which you have not the knowledge; surely the hearing and the sight and the heart, all of this shall be questioned about that." (17:36)

It is important, in any research, neither to confirm nor refute (reject) a view without taking into consideration all the relevant information available

and even then one has to reserve judgement till one arrives at a certain result. It is quoted from Imām **al-Sādiq** (AS) as having said:

«ان اللّه تبارك و تعالى خصّ عباده بآيتين من كتابه ان لا يقولوا حتّى يعلموا و لا يردوا مالم يعلموا. قال اللّه عزوجل:«الم يوخذ عليهم ميثاق الكتاب ان لا يقولوا على اللّه الا الحق...» (الاعراف/١۶٩)، و قال: «بل كذبوا بمالم يحيطوا بعلمه و لما يأتهم تأويله...» (يونس/٣٩)

``Allah has earmarked two verses from His Book (Quran) for his creatutes: not to speak on any subject until they know about it, nor reject what they do not know. Allah has said: `Did they not pledge not to utter but the truth about God.' and Allah has said: `They rejected what they did not know while they had not access to its interpretation'."[56]

Unfortunately, overlooking this important principle has led some research scholars in natural sciences to some unfounded generalisatitons or rejections, thus causing irreparable material and spiritual loss to human societies. Atheism and materialism, predominant in certain academic circles, are striking examples of this wrong attitude. Those who base their

judgements on perceptibles alone have no right to deny supra-perceptible realities. The most they are entitled to do is to keep silent in such matters. Researchers should always bear in mind the advice given by **Ibn Sīnā** (Avicenna) in his *al-`Ishārāt wa al-Tanbīhāt* which in fact, beautifully elaborates the spirit of the aforementioned Quranic verses. It goes as follows:

> *"Lest you believe that rejecting is the sign of cleverness or disgusting vulgarity; because this is (a sing of) imbecility and weakness. Rejection of what is not clear to you is no less foolish than confirming what is not proved to you. Should you hear something which sounds odd to you, you should hang onto it unless you have a proof for its improbability. It is advisable that you consider such issues just probable as long as they have not been rejected by firm proofs..."*[57]

c- Superficiality

The Quran strongly condemns those who look at the natural phenomena superficially and pass comments without trying to find reasons behind the natural

events:

«و قالوا لو كنّا نسمع او نعقل ما كنّا فی اصحاب السعير» (الملك/١٠)

``And they shall say: Had we but listened or ponder, we should not have not been among the inmates of the burning fire." (67:10)

«... و يجعل الرجس على الذين لا يعقلون» (يونس/١٠٠)

``...and He casts uncleaness on those who will not understand." (10:100)

«و اذا ناديتم الى الصلوة اتخذوها هزواً و لعباً ذلك بأنّهم قوم لا يعقلون» (المائده/٥٨)

``And when you call to prayer they make mockery and a joke; this is because they are a people who do not understand." (5:58)

«و منهم من يستمعون اليك افانت تسمع الصّم و لو كانوا لايعقلون» (يونس/٤٢)

``And there are those of them who hear you, but can you make the deaf to hear though they will not understand?" (10:42)

«افلم يسيروا فی الارض فتكون لهم قلوب يعقلون بها...» (الحج/٤٦)

``And have they not travelled in the land so that they should have hearts with which to

understand, ..." (22:46)

«يعلمون ظاهراً من الحيوة الدنيا و هم الاخرة هم غافلون» (الروم/٧)

"They know the outward of this world's life, but of the Hereafter they are absolutely heedless." (30:7)

«و كاين من اية فى السماوات و الارض يمرّون عليها و هم عنها معرضون» (يوسف/١٠٥)

"And how many a sign in the heavens and the earth which they pass by, yet they turn aside from it." (12:105)

On the basis of the following two verses we can conclude that the fundamental difference between man and beasts of burden lies in rationality; therefore, a man not utilising his reason is even less conscious of the right way than animals:

«انّ شرالدواب عندالله الصمّ البكم الذين لايعقلون» (الانفال/٢٢)

"Surely the vilest of animals, in Allah's sight, are the deaf, the dumb, who do not understand." (8:22)

«أم تحسب انّ اكثرهم يسمعون او يعقلون ان هم الاّ كالانعام بل هم أضل سبيلاً» (الفرقان/٤٤)

"Or do you think that most of them do hear or

understand? They are nothing but as cattle; nay, they are astraying farther off from the path." (25:44)

4- Indifference toward cravina for the truth

One of the important factors that leads a researcher, in any field of research, to success is that the researcher should solely look for the truth. The glorious Quran calls on man to seek and follow the truth:

«... فبشّر عباد* الذين يستمعون القول فيتبعون احسنه اولئك الذين هديهم اللّه و اولئك هم اولوا الالباب» (الزمر/ ١٧ ـ ١٨)

"Therefore, give good news to My servants who listen to the word, then follow the best of it. These are whom Allah has guided and who are the men of understanding." (39:18)

«... افمن يهدى الى الحق احق ان يتبع امّن لا يهدى الّا ان يهدى...» (يونس/ ٣٥)

"... Is He then Who guides to the truth more worth to be followed, or he who himself does not go aright unless he is guided?..." (10:35)

«...لقد جاءك الحق من ربك فلا تكونن من الممترين.» (يونس/ ٩٤)

"...certainlythe truth has come to you from your Lord. Therefore, you should not be of the disputers." (10:94)

«... فـماذا بـعد الحـق الّـا الضـلال فـانّى تـصرفون» (يونس/٣٢)

"...what is there after the truth but error; how are you then turned back?" (10:32)

Furthermore, the Quran condemns those who have no craving for truth or do not accept it when it is said to them:

«فقد كذّبوا بالحق لمّا جائهم...» (الانعام/٥)

"So they have indeed rejected the truth when it came to them." (6:5)

«لقد جئناكم بالحق ولكـن اكـثركم للـحق كـارهون» (الزخرف/٧٨)

"Certainly we have brougth you the truth, but most of you are adverse to the truth." (43:78)

«و من اظلم ممن افترى على اللّه كذباً او كذّب بالحق لمّا جاءه...» (العنكبوت/٦٨)

"And who is more unjust than, one who forges a lie against Allah, or gives the lie to the truth when it has come to him." (29:68)

«ساصرف عن اياتى الذين يتكبرون فى الارض بغير الحق و ان يروا كل اية لا يؤمنوا بها و ان يروا سـبيل

الرشد لا يتخذوه سبيلاً و ان يروا سبيل الغى يـتخذوه سبيلاً ذلك بانّهم كذبوا باياتنا وكـانوا عـنها غـافلين» (الاعراف/۱۴۶)

``I will turn away from my signs those who are unjustly proud in the earth; and if they see every sign they will not believe in it; and if they see the way of rectitude they do not take it for a way, and if they see the way of error, they take it for a way. This is because they rejected our signs and were heedless of them." (7:146)

In the light of the glorious verses which follow, one comes to realise that Divine verses are instructive for the people who eagerly listen to and think about what they hear, and finally accept what is right:[58]

«و من اياته منامكم بالليل والنهار وابتغاؤكم من فضله انّ فى ذلك لايات لقوم يسمعون» (الروم/۲۳)

``And one of His signs is your sleeping and your seeking of His grace by night and (by) day: most surely there are signs in this for people who would hear." (30:23)

«واللّه انزل من السماء ماءً فاحيا به الارض بعد موتها انّ فى ذلك لاية لقوم يسمعون» (النحل/۶۵)

``And Allah has sent down water from the heaven (cloud) and therewith given life to the

earth after its death; most surely there is a sign in this for a people who would listen." (16:65)

VII. Guiding Principles in Understanding Nature

We have already said that the Quran is not a book of natural science but a book of guidance and enlightenment, and wherever there is reference to the natural phenomena, it is meant to guide man through them. We also explained that God has gifted man with mental faculties so that through his own endeavours and God's help he can gradually come to understand the universe as well as his own self, and in that way to get nearer to the Creator of the universe.

According to the following glorious verses:

«... و نزّلنا عليك الكتاب تبياناً لكل شيء و هدىً و رحمة و بشرى للمسلمين» (النحل/٨٩)

"...and we have revealed the book to you explaining clearly everything, and as a guidance and mercy and good news for those who submit." (16:89),

«... ما فرّطنا في الكتاب من شيء...» (الانعام/٣٨)

..."we have not neglected anything in the Book..." (6:38),

the Quran undertakes the guidance of human beings in all stages of life. One, therefore, can expect to derive the guiding principles for researches done in natural sciences frome the Quran. By inference from the Quran we believe that, in addition to the principles of logic, such as the principle of ``nonöcontradiction", the following principles should be also used as the guidelines for scientific research.

1- Faith in the principle of Divine unity (al-Tawhīd)

According to the Quranic verses, God is the only Creator and Ruler of the whole universe. Everything originates from Him and ends in Him. All creatures praise Allah, as the purpose behind the creation of man was to approach Allah through worshipping Him:

«وما خلقت الجنّ والانس الّا ليعبدون»
(الذاريات/۵۶)

``And I have not created the jinn and the man except that they would worship Me." (51:56)

Hence, every step one takes should be aimed at gaining His consent and getting closer to the Almighty. The seach for the discovery of nature is no exception to this rule. Observance of the grandeur in the Divine deeds, and making use of the possibilities therein for

man to attain the eternal happiness should be given priority.

The Quran does not approve of such cognitions which aim at nothing except satisfying one's own curiosity. On the way of understanding nature, one should not busy oneself with the means and forget the ultimate end. If the researcher realises that God is Infinite in all respects, his attention to this infinite source keeps him moving on without hindrance, and he will be able to find more and more about the magnificence of creation. This is the surest way of attaining proximity to the Creator of the universe.

The understanding of nature should lead us along the road covered by prophet `**Ibrāhīm** (Abraham), i.e. commencing from the beginning of the string of causes and reaching the end ö the Lord of the universe.

«فلمّا جَنّ عليه اللّيل رأى كوكبا قال هذا ربى فلمّا افل
قال آنى لا احب الافلين* فلما رأىالقمر بازغا قال هذا
ربى فلمّا افل قال لئن لم يهدنى ربى لاكونن من القوم
الضالين* فلما رأى الشمس بازغة قال هذا ربى هذااكبر
فلمّا افلت قال يا قوم انـى بـرى مـما تشـركون* انـى
وجّهت وجهى للّذى فطر السماوات والارض حنيفا و
ما انا من المشركين» (الانعام/٧۶-٧٩)

``*So when the night shadowed ö over him, he*

saw a star, said he: Is this my Lord? So when it set, he said: I do not love the setting ones.' Then when he saw the moon rising, he said; `Is this my Lord?' So when it set, he said: `if my Lords had not guided me I should certainly be of the erring people.' Then when he saw the sun rising, he said: `Is this my Lord? Is this the greatest?' So when it set, he said: `O my people! Surely I am clear of what you set up (with Allah). Surely I have turned myself, being upright, wholly to Him who originated the heavens and the earth, and I am not of the polytheists'." (6:76-79)

As a result, **`Ibrāhīm** (AS) was led to see the spiritual dimension of the heavens and the earth:

«و كذلك نرى ابراهيم ملكوت السماوات والارض و ليكون من الموقنين» (الانعام/۷۵)

``And thus did We show Ibrahim the spiritual dimension of the heavens and the earth and that he might be of those who are sure." (6:75)

and this is the way which all researchers have been invited to follow:

«او لم ينظروا فى ملكوت السماوات والارض و ما خلق الله من شيء...» (الاعراف/۱۸۵)

> *" Do they not consider the spiritual dimension of the heavens and the earth and whatever things Allah has created..." (7:185)*

A firm belief in monotheism arms the researcher with a comprehensive view of nature, not seeing it as a bundle of isolated pieces; rather, he observes their interrelations and thier common origin. He sees a unity behind every multiplicity. Experiences of the past generations show that the scholars in the past always endeavoured to find a model according to which they could describe the whole nature. The Greeks had their designs for the explanation of the whole universe. In the Islamic world, too, different schools tried in different ways to discover a pattern for relating together various components of nature.

After the Renaissance, Newton tried to explain the celestial and terrestrial movements by the help of a series of laws. Then Einstein tried to take a step further than Newton in relation to natural issues. In the recent years, too, the main effort of the theoretical physicists has been to derive all the natural forces from one source. In all these stages it is quite apparent that the scientists have been trying to find suitable patterns by the help of which they could interpret the natural

phenomena. They have been trying to generalise the result of an experiment carried out on the earth and apply it to the whole physical world.

This character of seeking for unification has been noticed among all scientists (whether materialist or nonömaterialist), and seems to be intrinsic to man. The difference between the two groups is that the former come to stop as soon as they reach the appearance; while the latter seek for the Coordinator of this harmonious system. Here we cite two glorious verses from the Quran: the first refers to the first group, while the second reveals the opinion of the second:

«و قالوا ماهی الّا حیاتنا الدنیا نموت و نحیا و ما یهلکنا
الّا الدهر و ما لهم بذلك من علم ان هم الاّ یظنّون»
(الجاثیة/۲۴)

1- "And they say: There is nothing but our life in this world; we live and die and nothing destroys us but time, and they have no knowledge of that; they only conjecture." (45:24)

«خلق السماوات و الارض بالحق تعالی عمّا یشرکون»
(النحل/۳)

2- " He created the heavens and the earth in

truth, highly exalted be He above what they associate (with Him). " (16:3)

An important point, which is greatly emphasised in the Quran, is the existence of order in natural phenomena, harmony among the various elements of nature, and a purpose in nature:

«... و كل شيء عنده بمقدار» (الرعد/٨)

" And there is a measure with Him of everything." (13:8)

«... و خلق كل شيء فقدّره تقديراً» (الفرقان/٢)

" And who created everything then ordained for it a measure." 25:2)

«... ما ترى في خلق الرحمن من تفاوت فارجع البصر هل ترى من فطور» (الملك/٣)

"... You see no incongruity in the creation of the Beneficient Allah, then look again, can you see any disorder?" (67:3)

The existence of this order and design is an indication of monotheism ö the unity of the Almighty God:

«...لو كان فيها آلهة الا الله لفسدتا...» (الانبياء/٢٢)

" If there had been in them any gods except Allah, they would both have certainly been in a state of disorder." (21:22)

«... و ما كان معه من إله إذاً لذهب كل إله بما خلق و

لعلا بعضهم على بعض...» (المومنون/٩١)

"... and never was there with Him any (other) god - in that case would each god have certainly taken away what he created, and some of them would certainly have overpowered others..." (23:91)

«صنع الله الذى اتقن كل شىء...» (النمل/٨٨)

"... the handiwork of Allah who has made everything thoroughly..." (27:88)

Belief in this principle is an important factor in encouraging scholars in their discovery of the laws of nature. In principle, any attempt to discover inter-relations in various aspects of nature without admitting order would look futile, as it would remain a local and temporary one.

A Belief in this principle makes us realise that wherever we failed to find the order in a natural phenomenon during our study, it would be due to the insufficiency of our knowledge rather than indicating the ruling of chance in nature.

During the early years of the second quarter of the twentieth century, when quantum mechanics was appearing, some of the pioneers of theoretical physics rejected the idea of the existence of order in the

atomic domain. **Einstein**, though unable to present a successful alterative, was able to reject it by appealing to the principle of order in nature. In his letter to **Max Born** in December 1926, he wrote:

> " *Quantum mechanics is certainly imposing. But an inner voice tells me that it is not yet the real thing. The theory says a lot, but does not really bring us any closer to the secret of the ``Old one''. I, at any rate, am convinced that He is not playing at dice.*"[59]

In another letter to Born, in September 1944, he wrote:

> " *We have become Antipodean in our scientific expectations. You believe in the God who plays dice, and I in complete law and order in a world which objectively exists, and which I, in a wildly speculative way, am trying to capture. I firmly believe, but I hope that someone will discover a more realistic way, or rather a more tangible basis than it has been my lot to find. Even the great initial success of the quantum theory does not make me believe in the fundamental dice-game, although I am well aware that our younger colleagues interpret this*

as a consequence of senility. No doubt the day will come when we will see whose instinctive attitude was the correct one."[60]

Despite their disbelief in monotheism, some philosophers believe in the existence of order in nature. But from our point of view, order, unity and co-ordination in nature can only be accounted for through the principle of monotheism (God's Oneness.)

Another conclusion drawn from the principle of monotheism is that the researcher, by observing the relation between the various aspects of nature, finds a unity among different branches of science and considers every one of them as a description of one dimension of the whole reality, and, therefore, does not reject any of them on the ground of his own unfamiliarity with it.

2- Belief in the reality of the external World

From the Quranic viewpoint, there is a real external world, indendent of our mind:

«و فی الارض ایات للموقنین* و فـی انـفسکم افـلا تبصرون» (الذاریات/ ٢٠-٢١)

"And in the earth there are signs for those who are sure, and in your own souls (too): will you

not then see?" (51:20-21

«لخلق السماوات والارض أكبر من خلق الناس و لكن أكثر الناس لا يعلمون» (المؤمن /٥٧)

`` Certainly the creation of the heavens and the earth is greater than the creation of the men, but most people do not know." (40:57)

«سبحان الذى خلق الازواج كلها مما تنبت الارض و من انفسهم و مما لا يعلمون» (يس /٣٦)

`` Glory be to Him Who created pairs of all things, of what the earth grows, and of their kind and of what they do not know." (36:36)

«الذى جعل لكم الارض مهداً و جعل لكم فيها سبلا لعلكم تهتدون... والذى خلق الازواج كلها و جعل لكم من الفلك والانعام ما تركبون» (الزخرف /١٠-١٢)

`` He Who made the earth a resting place for you, and made in it ways for you that you may go aright: And He Who created pairs of all things, and made for you of the ships and the cattle what you ride on." (43:10ö12)

«و الله اخرجكم من بطون امهاتكم لا تعلمون شيئا و جعل لكم السمع والابصار والافئدة...» (النحل /٧٨)

`` And Allah has brought you forth from the wombs of your mothers ö you did not know anythingö and He gave you the hearing and the

sight and hearts..." (16:78)

«و تحسبهم ايقاظاً و هم رقود و نقلّبهم ذات اليـمين و ذات الشمال و كلبهم باسط ذراعيه بالوصيد. لو اطلعت عـليهم لولّيت مـنهم فـرارا ولمـلئت مـنهم رعـبا» (الكهف/١٨)

"And you might think awake while they were asleep, and We turned them about to the right and to the left, while their dog (lay) outstretching its paws at the entrance; if you looked at them you would certatinly turn back from them in flight, and you would certainly be filled with awe because of them." (18:18)

«و تـرى الجـبال تـحسبها جـامدة و هـى تـمرّ مـرّ الحساب...» (النحل/٨٨)

"And you see the mountains, you think them to be sailed, and they shall pass away as the passing away of the cloud." (27:88)

«و ما يتبع اكثرهم الاظنا ان الظن لايـغنى مـن الحـق شيئا...» (يونس/٣۶)

"And most of them do not follow (anyting) but conjecture; surely conjecture will not avail against the truth." (10:36)

These verses indicate that there exist realities other than and independent of our minds. If our mental

image of a certain object does not correspond with the external reality, our mental image is not more than a fancy or imagination, which cannot lead us to reality.

Moroever, had there not been an external world, the Quran would not have so emphatically recommended the study of nature:

«قل سيروا في الارض فانظروا كيف بدأ الخلق...»
(العنكبوت/٢٠)

" Say: travel in the earth and see how He makes the first creation..." (29:20)

«قل انظروا ماذا في السماوات والارض...»
(يونس/١٠١)

" Say: look and see what there are in the heaven and the earth..." (10:101)

«اولم ينظروا في ملكوت السماوات والارض و ما خلق الله من شيء...» (الاعراف/١٨٥)

" Do they not consider the spiritual dimension of the heavens and the earth and whatever things Allah has created." (7:185)

Belief in the reality of the external world is the basis of all researches in all of the empirical sciences, and without it any scientific research would be only a mental exercise. As **Einstein** puts it in his commemorative paper on **Maxwell**:

"The belief in an external world independent of the perceiving subject is the basis of all natural sciences.'[61]

3- Faith in supra-physical reality and limitation of human knowledge.

In this respect, we learn the following points from the Holy Quran:

(a) *Human knowledgeis limited*

«و ما اوتیتم من العلم الا قلیلا» (الاسراء/۸۵)

"...And you are not given aught of knowledge but a little." (17:85)

«سبحان الذی خلق الازواج کلّها مما تنبت الارض و من انفسهم و مما لا یعلمون» (یس/۳۶)

"Glory be to Him who created pairs of all things of what the earth grows, and of their kind and of what they do not know." (36:36)

«والخیل والبغال والحمیر ترکبوها و زینةً و یخلق ما لاتعلمون» (النمل/۸)

" And (He made) horses and mules and asses that you do ride upon them and as an ornment; and He creates what you do not know." (16:8)

(b) ***There are many things we cannot get through our senses***

«فلا أقسم بما تبصرون* و ما لا تبصرون» (الحاقة/ ٣٨-٣٩)

"I swear by what you see and what you don't see." (69:38-39)

«اللّه الذی رفع السماوات بغیر عمد ترونها...» (الرعد/٢)

"Allah is He Who roused the heavens without any pillars that you see, and He is firm in power..." (13:2)

(c) ***We should believe in the occult, i.e., in supernatural realities***[62]

«ذلك الكتاب لا ریب فیه هدی للمتقین* الذین یؤمنون بالغیب و یقیمون الصلاة و مما رزقنا هم ینفقون» (البقره/٢-٣)

"This book, there is no doubt in it, is a guide to those who guard (against evil). Those who believe in the occult and keep up prayer and spend out of what We have given them." (2:2ö3)

The faith in the limitation of human knowledge and the metaphysical realities leads us to the following

corollaries:

1- Never to think we have discovered everything. Of course, this by no means indicates that man will not be able to discover any of the truths in the world, but we should not claim to have a full understnding of a natural phenomenon at a certain time. **Sayyid Qutb** in his interpretation of the verse 3 in chapter *al-Baqarah* says:

> *``Faith in the supra-physical is a stage by attaining which man rises above the level of animality öat which perception is confined to the domain of external sensesö and reaches the stage of humanity, a much larger and more spacious domain beyond the limited domain of external senses opens up before him. The transference to this new stage brings a radical change in man's view of the reality of existence in general, and his own self in particular. and he perceives hiden powers in the universe; how, he is greatly affected by a new feeling and can perceive in the creation the Power and Wisdom at work behind it. This transference affects the realities of one's life, because there is a great difference between a person whose life is*

entrenched in the limited span of sensory perception and the one whose soul and insight take him to the vast kingdom (of higher realities) where he can hear and feel the mysterious music and inspiration gushes out of the depths of his heart. He feels that the extent of the universe is too great for him to comprehend during his short span of life. He realises that beyond the seen and unseen universe of existence, there exists a truth much greater than existence and He is the Creator and the Preseverof it. This truth is not visible to human eye and is not discerned by human wisdom alone.

This feeling (knowledge of the immensity of the unkown) safeguards the limited human faculty of thinking and does not let it go astray and waste itself in the areas for which it has not been created.'[63]

4- Belief in the principle of general causality

The principle of causality says that every event requires a cause. This principle has two important corrolaries:

(a) The Principle of Determinism: any effect requires a cause, and without a cause it is impossible to have an effect.

(b) The Principle of Uniformity of Nature: similar causes entail similar effects.

These two corrolaries are inseparable from the principle of general causality, and any violation in them will be the violation of the principle of general causality.[64]

After this brief introduction, we want to demonstrate that the Quran admits the principle of general causality:

(A) In the Quran we have many verses which talk of unchangeable patterns (*sunan*) of Allah in the universe:

«سنة من قد ارسلنا قبلك من رسلنا و لا لسنتنا تحويلا» (الاسراء/ ٧٧)

"(This is Our) course with regard to those of Our messengers whom We sent before you, and you shall not find a change in our course." (17:77)

«سنة الله فى‌الذين خلوا من قبل و لن تجد لسنة اللّه تبديلا» (الاحزاب/ ٦٢)

"(Such has been) the course of Allah with

respect to those who have gone before; and you shall not find any change in the course of Allah." (33:62)

«ما كان على النبى من حرج فيما فرض اللّه له سنة اللّه فى‌الذين خلوا من قبل و كان امـراللّـه قـدراً مـقدورا» (الاحزاب/۳۸)

``There is no harm in the prophet doing that which Allah has ordained for him; such has been the course of Allah with respect to those who have gone before; and the command of Allah is a decree that is made absolute." (33:38)

«يريد اللّـه ليـبين لكـم و يـهديكم سـنن الذيـن مـن قبلكم...» (النساء/۲۶)

`` Allah desires to explain to you, and to guide you into the ways of those before you,..."(4:26)

We find many examples of these patterns in the Quran itself:

«... ان اللّه لا يغير ما بقوم حتى يغيروا ما بانفسهم...» (الرعد/۱۱)

``Most surely Allah does not change the condition of a people until they change their own condition." (13:11)

«و اذا اردنا ان نهلك قرية امرنا مترفيهاففسقوا فيها...»

(الاسراء/۱۶)

``And when We wish to destroy a town, we send Our commandment to the people of it who lead easy lives; but they transgress therein... So We deatroy it with utter destruction." (17:16)

«وعداللّه الذين امنوا منكم و عملوا الصالحات ليستخلفنّهم فى الارض...» النور/۵۵)

`` Allah has promised to those of you who believe and do good that We most certainly make them rulers in the esrth..." (24:55)

«ولاتهنوا ولاتحزنوا وانتم الاعلون ان كنتم مؤمنين...» (آل‌عمران/۱۳۹)

`` And be not infirm, and be not grieving, and you shall have the upper hand if you are believers." (3:139)

«و ما كان ربك ليهلك القرى بظلم و اهلها مصلحون» (هود/۱۱۷)

``And it did not beseem your Lord to have destroyed the towns tyrannously, while their people acted well." (11:117)

«... فأما الزبد فيذهب جفاء واما ما ينفع الناس فيمكث فى‌الارض...» (الرعد/۱۷)

``...then as for the scum, it passes away as a worthless thing; and as for that which profits

the people, it tarries in the earth..."(13:17)

«... ولا يحيق المكرالسيئ الا باهله فهل ينظرون الاسنة الاولين فلن تجد لسنة اللّه تبديلا ولن تجد لسنة اللّه تحويلا» (فاطر/۴۳)

"...and the evil plans shall not beset any save the authors of it. Then should they wait for aught except the former people? For you shall not find any alteration in the course of Allah; and you shall not find any change in the course of Allah." (35:43)

(B) Some of the Quranic verses indicate that both the creation and the course of events in nature follow a certain measure, and every natural being has a definite and precise life span:

«الشمس والقمر بحسبان» (الرحمن/۵)

"The sun and the moon follw a reckoning." (55:5)

«و إن من شيء الاعندنا خزائنه و ما ننزله الابقدر معلوم» (الحجر/۲۱)

"And there is not a thing but with Us are the treasures of it, and we do not send it down but in a knowing measure." (15:21)

«... و كل شيء عنده بمقدار» (الرعد/۸)

"...and there is a measure with Him of

everything." (13:8)

«أولم يتفكروا فى انفسهم ما خلق اللّه السماوات والارض و ما بينهما الا بالحق و اجل مسمى و ان كثيرا من الناس بلقاء ربهم لكافرون» (الروم/٨)

`` Do they not reflect within themselves: Allah did not create the heavens the heavens and the earth and what is between them but with truth, and (for) an appointed term? And most surely most of the people are deniers of the meeting of their Lord?" (30:8)

C) Some verses mention the mechanism and the specific course of certain events in nature:

«و لقد خلقنا الانسان من سلالة من طين* ثم جعلناه نطفة فى قرار مكين...» (المؤمنون/١٢-١٣)

`` and certainly We created man of an extract of clay, then we made a small life-germ in a firm resting place." (23:12-13)

«و انزل من السماء ماءً فاخرج به من الثمرات رزقا لكم...» (البقره/٢٢)

``And (Who) sends down rain from the cloud, then brings forth with it subsistance for you." (2:22)

«... قال ابراهيم فان اللّه يأتى بالشمس من المشرق فأت بها من المغرب فبهت الذى كفر...»

(البقره /٢٥٨)

"...Ibrahim said: so surely Allah causes the sun to rise from the east. Then make it rise from the west. Thus he who disbelieved was confounded..." (2:258)

«والشمس تجرى لمستقرلها ذلك تقدير العزيز العليم* والقمر قدرناه منازل حتى عاد كالعرجون القديم* لاالشمس ينبغى لها ان تدرك القمر ولا الليل سابق النهار وكل فى فلك يسبحون» (يس /٣٨-٤٠)

"And the sun runs on to a term appointed for it, that is the ordinance of the mighty, the knowing. And (as for) the moon, We have ordained for it stages till it becomes again as an old dry palm branch. Neither is it allowable to the sun that it should overtake the moon, nor can the night outstrip the day; and all of them float through space." (36:38-40)

D) Some verses talk of the role of certain intermediary causes in the occurrence of some events:

«وارسل عليهم طيرا ابابيل* ترميهم بحجارة من سجيل» (الفيل /٣-٤)

"And sent down (to prey) upon them birds in flocks, casting them against stones of baked clay." (105:3-4)

«والله انزل من السماء ماءً فأحيا به الارض بعد موتها...» (النحل/۶۵)

"And Allah has sent down water from the cloud and therewith given life to the earth after its death..." (16:65)

«و من الثمرات النخيل والاعناب تتخذون منه سكراً و رزقاً حسنا...» (النحل/۶۷)

"And of the fruits of the palms and the grapes ö you obtain from them intoxication and goodly provision." (16:67)

«وارسلنا الرياح لواقح...» (الحجر/۲۲)

"And We send the winds fertilizing..."(15:22)

«قاتلوهم يعذبهم الله بايديكم و يخزهم و ينصركم عليهم و يشف صدور قوم مؤمنين» (التوبه/۱۴)

"Fight them; Allah will punish them by your hands and bring them to disgrace, and assist you against them and heal the hearts of a believing people." (9:14)

These verses show that certain definite laws rule over the universe. This however, is meaningful only if the principle of geneal causality is valid. In this case every event stands in its definite place, i.e. every event appears under definite conditions and at a definite time and place. This does not imply that events are

independent of the Almighty's Will and order, but it means that everything is realised by God's Will, but through a special channel. Verses of the following type confirm this view:

«والبلد الطيب يخرج نباته باذن ربه والذی خبث لا یخرج الا نکدا...» (الاعراف/۵۸)

" And as for the good land, its vegetation springs forth (abundantly) by the permission of its Lord, and (as for) that which is inferior (its herbage) comes forth but scantly." (7:58)

«قدجاء کم من الله نور و کتاب مبین* یهدی به الله من اتبع رضوانه سبل السلام و یخرجهم من الظلمات الی النور باذنه...» (المائدة/ ۱۵-۱۶)

"... Indeed, there has come to you light and a clear book from Allah. With it Allah guides him who will follow His pleasure into the ways of safety and brings them out of utter darkness into light by His will..." (5:15- 16)

The first verse indicates that although God's Will is necessary for the growth of plants, yet the suitability of the land is also a condition. Not every sort of plant can be raised in every piece of land. With the suitablity of the land God makes it possible for the plant to grow.

It can be also deduced from the verses 15-16 of

chapter *Mā`idah* (food) that only those seeking God's consent would enjoy His guidance in the Quran.

Some well-known Muslim theologians, particularly of *Ash`arites* school, on the basis of verses like:

«... قل اللّه خالق كل شيء و هو الواحد القهار»
(الرعد/١۶)

`` Say: Allah is the Creator of all thing , and He is the One, the Supreme." (13:16)

«واللّه خلقكم و ما تعملون» (الصافات/٩۶)

`` And Allah has created you and what you make." (37:96)

«... الا له الخلق والامر...» (الاعراف/ ۵۴)

``... Surely His is the creation and command..." (7:54)

«... بل للّه الامر جميعا...» (الرعد/ ٣١)

``... The commandment is wholly Allah's..." (13:31)

«أفرأيتم ما تحرثون* ءأنتم تزرعونه ام نحن الزارعون» (الواقعه /۶٣-۶۴)

`` Have you considered what you saw? Is it you that cause it to grow or are We the causes of growth?" (56:63-64),

which attribute creation and governance of the universe to Allah, and verses like:

«قلنا يا نار كوني برداً و سلاماً على ابراهيم»
(الانبياء/۶۹)

" We said: O fire! be a comfort and peace to Ibrahim." (21:69),

which are indicative of the possibility of miracles, have rejected the law of causation in the physical world and say that physical means have no role in the realization of a phenomenon. The cause of any occurrence is God's Will, except that it is God's way to create what we call "effect" after what we call "cause", without any relation between them that necessitates the effect to follow the cause. They say: It is not fire which causes the cotton to burn; rather, it is Allah who makes the cotton burn and turns it into ashes; and of course, if God does not want, the fire will not burn the cotton. **al-Ghazzālī**, a chief representative of *Ash'arīsm*, in *Tahāfut al-Falāsifah* says:

> *"According to us, the connection between what is usually believed to be a cause and what is believed to be an effect is not a necessary connection. In the case of two things which are not identical and the affirmation or negation of one is not implied in the affirmation or negation of the other, neither the existence, nor*

the non-existence of the one necessitates the existence or the non-existence of the other. For example, the satisfaction of thirst does not imply drinking, nor satiety, eating, nor burning, contact with fire, nor light, sunrise, nor decapitation, death, nor recovery, taking of medicine, nor evacuation, the taking of a purgative, and so on for all the empirical connections existing in medicine, astronomy, the sciences and the crafts.

For the connections in these things are based on a prior power of God to create them in a succesive order, though not because this connection is necessary in itself and cannot be disjoined. On the contrary, it is God's power to create satiety without eating, and death without decapitation, and to let life persist notwithstanding the decapitation, and so on with respect to all connections.

The philosphers, however, deny this possibility and claim that it is impossible to investigate all these inumerable connections would take too long, and so we shall choose one single example, namely the burning of

cotton through contact with fire; for we regard it as possible that the contact might occur without burning taking place, and also that the cotton might be changed into ashes without any contact with fire, although the philosophers deny this possibility.

It is God who made the cotton burn and made it ashes either through intermediation of angels or without intermediation. For fire is a dead body which has no action and what is the proof that it is the agent? Indeed, the philosophers have no other proof than the observation of the occurrence of the burning, when there is contact with fire, but observtion proves only a simultaneity, not a causation, and in reality, there is no other cause but God."[65]

This theory is rooted in the idea that accepting a decisive order in the world would require the denial of God's power. Muslim philosophers reject the *Ash`arite* view and say:

a) The coincidence of two causes operating on a single object is impossible only when the two causes operate transversally, whereas the longitudinal operation of two causes on the same object is quite

possible.[66] If we believe in the longitudinal system of causes, we could relate every occurrence to God; because He gives it existence. This emanation, however, takes place through special channels. That is the reason why God attributes the regulating of affairs sometimes to Himself and sometimes to the angels:

«يدبر الامر من السماء الى الارض...» (السجدة/٥)

``He regulates the affairs from the heaven to the earth..." (32:5)

«فالمدبرات امرا» (النازعات/٥)

``...By those who regulate an affair..." (79:5)

He also attributes taking of souls to Himself or to angels:

«الله يتوفى الانفس حين موتها...» (الزمر/٤٢)

``Allah takes the souls at the time of their death." (39:42)

«قل يتوفيكم ملك الموت الذى وكّل بكم...» (السجدة/١١)

``Say: the angel of death who is given charge of you shall cause you to die." (32:11)

b) In the case of material bodies, what is commonly called ``cause" is not the efficient cause but it is an intermediary or preparing cause which prepares the ground for God's bounty. These causes are

materialistic and preparatory requirements for an event to occur, and are sometimes interpreted as the transversal system of causes. So, one can say that God is the cause for everyting, but he makes everything under certain terms and through certain means; and of course, all these means and ways are the objects made by the Almighty Himself. **Sadr al-Dīn Shīrāzī** explains Muslim philosophers' view in the following way:

> ``*Another group of philosophers and some elite among our Imamiah scholars say that objects vary in their acceptance of existence from the Origin. Some do not yield to existence unless another being precedes them, in the same way that accident should follow substance. Thus the Creator, whose power is unlimited, grants the existence according to the possiblities through a particular order and in consideration of its various capabilities. Some come dircetly from Him, some through an intermediary or intermediaries. In the last from, nothing can come into existence unless its means and pre-requisites come into reality. God Himself is the Cause without a cause. Requirements for existence are not the result of deficiency in the*

> *Almighty's power, but due to weakness in the reciever of emanation. How can one imagine any need or deficiency in the Creator, while means and ways are all originated from Him? Therefore, the Glorious God does not need any help in the creation of anything.'*[67]

Thus, verses of the following type:

> «افرايتم ما تحرثون* ءأنتم تزرعونه ام نحن الزارعون * لونشاء لجعلناه حطاماً فظلتم تفكهون... أفرايتم الماء الذى تشربون* ءأنتم انزلتموه من المزن ام نحن المنزلون* لو نشاء لجعلناه اجاجا فلولا تشكرون»
> (الواقعه/۶۳-۷۰)
>
> *`` Have you considered what you saw? Is it you that cause it to grow, or are We the cause of growth? If We pleased, We should have certainly made it broken down into pieces, then would you begin to lament: Surely We are burdened with debt: Nay! We are deprived. Have you considered the water which you drink? Is it you that send it down from the clouds, or are We the senders? If We pleased, We would have made it saltish; why do you not then give thanks?" (56:63-70)*

which have been used as the basis of reasoning by

Imām **Fakhr al-Dīn Rāzī**[68] in the rejection of the system of cause and effect do not indicate the negation of intermediary means in the occurence of natural phenomena, but they indicate that we should not stop at the channels of emanation and should not remain unaware of the main cause who is the Commander (Ruler) of the whole universe, life giver to all, and He who is at the head of the longitudinal system of all causes, nor should we think that these are self-activating. As the late Dr. **Beheshtī** puts it:

> *"The fact is that Holy Quran wants to guide man from this end of the cord, i.e. sensibles, to the other end of the cord which is Allah. It wants that man does not stop at intermediary causes and fail in reaching the Origin. In all of the verses there is a voice which says: 'Be alert', while you are studying this world, don't slip into a sitch; take care not to leave the cord; do not drown yourself in the world of matter or contingents... It is true that for agriculture you make preparations, which you should, but do not imagine that the cord is fully in your hand. Do you not see that at times you find a green sapling suddenly dies and fades despite the*

> *utmost care and with all the modern and old means that you employ to make it grow? Thus you, with all the means that you have at your disposal, are too insignificant to have the end of the cord. It is true that your drinking water comes down from the clouds, but do not let your keen eye to linger on the cloud saying that the water in the cloud is pure. the Quran says: it may rain, but the rain might be so badly contaminated or bitter and distasteful that one could not drink a drop of it; so the end of the cord of your drinking water is not in the hand of the cloud, but in the hand of the Wise Omnipotent, Who has created clouds and hundreds of other agents which work under his command and furnish men with fresh tasty water."*[69]

In the case of miracles, too, considering the invariability of Divine patterns in nature, we do not find it necessary to look for the exceptions in the laws of nature; because if we find a deviation from a natural law, this does not necessarily means that the law is not correct or that the law of causality is violated. Because it is possible to make one law

ineffective by the help of another law in the universe. If a body falls because of gravity, this force may be neutralised by the use of another force. Therefore, on the observance of a suspended body in the air, we should not immediately suppose that there is no such law as gravitation; rather, we can assume that there is another force besides the force of gravity. As the late **Murtadā Mutahharī** put it:

> *"Neither do the laws of creation yield themselves to exceptions, nor are miracles exceptional deeds in the laws of creation. If we observe certain changes in the patterns of the universe, it is because of the interference of other patterns or laws, which, they too, have general validity under their own special conditions. That is, one law dose not change without the effect of another law. In the universe, all the laws, courses and patterns are invariable. If a dead (man) comes back to life, it follows a law of its own; if a son is born withot having a fatherö as in the case of ʾĪsābin Maryam (Jesus Christ) ö that, too, is not against Allah's course or the laws of the universe; the problem is that man does not*

> *know all the patterns and laws of the universe, and what he knows as a law, in many cases has the appearance of a law and is not a real one."*[70]

After the appearance of the quntum theory in physics, and the presentation of the principle of uncertainty by W. Heisenberg in the early years of the second quarter of the present century, some of the founders of this theory denied the existence of causal system in the world of particles and permitted the rejection of the principle of uniformity of nature and the principle of determinism, and gave a statistical status to the laws of microphysics. Most of the physicists, with the exception of some prominent ones likes Planck and Einstein, raised their voices in favour of the new theory and more or less accepted its orthodox interpretation, a situation which is still going on, although the lapse of time has increased the number of opponents.

Einstein and his colleagues rejected this theory because they could not accept that probabilities were ruling over the universe. From their viewpoint, the objective of physics should be to explain all natural phenomena according to absolute laws. The reason

why we stick to statistical laws is that we are either ignorant of absolute laws which are the basis of statistical laws, or dealing with innumerable particles makes us stick to statistical mathematics for the sake of simplification. As **Einstein** put it in his 1933 lecture at oxford:

> *"I cannot but confess that I attach only a transitory importance to this interpretation. I still believe in the possibility of a model of reality - that is to say, of a theory which represents things themselves and not merely the probability of their occurrence."*[71]

In a letter addressed to Born in April 1924 **Einstein** wrote:

> *"... I should not want to be forced into abandoning strict causality without defending it more strongly than I have so far. I find the idea quite intolerable that an electron exposed to radiation should choose of its own free will, not only its moment to jump off, but also its direction. In that case, I would rather be a cobbler, or even an employee in a gambling house, rather than a physicist. Certainly my attempts to give tangible form to the quanta*

have foundered again and again, but I am far from giving up hope. And even if it never works there is always that consolation that this lack of success is entirely mine."[72]

In recent years we come across some Muslim scholars[73] who have revived the forsaken theory of the Muslim theologians, citing the quantum theory as a proof for their claims. To answer them, we are going to quote **Dirac**, who was one of the founders of quantum physics. In a recent paper (1979) he said:

"It seems clear that the present quantum mechanics is not in its final form. Some further changes will be needed, just about as drastic as the changes which one made in passing from Bohr's orbits to quantum mechanics. Some day a new relativistic quantum mechanics will be discovered in which we don't have these infinities occurring at all. It might very well be that the new quantum mechanics will have determinism in the way that Einstein wanted. This determinism will be introduced only at the expense of abandoning some other preconceptions which physicicts now hold, and which it is not sensible to try to get at now.

So under these conditions I think it is very likely, or at any rate quite possible, that in the long run Einstein will turn out to be correct, even though for the time being, physicists have to accept the Bohr probability interpretation -- especially if they have examinations in front of them."[74]

Finally, in confuting those who deny the validity of the principle of causality in the atomic and sub-atomic domain, we say:

a) If we deny the validity of the principle of causality in the atomic and sub-atomic world, this would mean defacing this principle in relation to the whole world, because causality brings the whole world together. As the Persian mystic Shaykh **Shabistarī** puts it:

اگر یک ذرّه را بر گیری از جای

همه عالم خلل یابد سراپای

"If you remove a single particle out of its place, the whole world tumbles down."

b) The generalisation of the results of a limited number of experiments in the form of general laws and scientific theories becomes meaningful if the principle of causality holds. Because in accepting something as a

law we also accept that:

(i) Every effect has a cause

(ii) The relation between cause and effect is indispensable

(iii) Similar causes entail similar effects

In practice, no one can be sure of considering all the relevant factors and parameters. Therefore, generalizations cannot have absolute validity. This limitation, however, arises from the deficiency in our information. In any case, we believe that faith in the existence of abeolute laws can be meaningful only if the principle of uniformity of nature is valid. As **Planck** put it:

> *"Of course it may be said that the law of causality is only after all a hypothesis. If it be a hypothesis, it is not a hypothesis like most of the others, but it is a fundamental hypothesis because it is the postulate which is necessary to give sense and meaning to the application of all hypotheses in scientific research. This is because any hypothesis which indicates a definite rule presupposes the validity of the principle of causation."*[75]

c) Should the principle of causality turn out to be

invalid, nothing would be the result of a proof, because the proof is the cause of our knowledge of the desired result, and if the tie between proof and result be non-essential, the proof may not end in the result. In such a case nothing would be the result of a proof; and any proof might lead to any result; and there would be no difference between producing a proof and not producing it. That is why even those who reject the principle of causality accept it implicitly, because they admit that their proof will undermine our faith in the principle of causality.[76]

d) As the late Professor **Murtadā Mutahharī** and the late Allāmah **Mohammad Bāqir Sadr** have pointed out,[77] the impossibility of prediction in atomic domain arises from our ignorance about the deterministic laws governing atomic phenomena rather than ineffectiveness of the principle of causality and its corrolaries in the atomic world. This in itself is due either to the deficiency in the means of experimentation or due to the immeasurability of the effects of the experimentalist on the experiments. In any case, we should note that our failure in the discovery of a cause does not mean its non-existence, and we have no proof to say that modern scince has

discovered all the relevant factors. As **Einstein** put it:

> *"Therefore, the fact that in science we have to be content with an incomplete picture of the physical universe is not due to the nature of the universe itself but rather to us."*[78]

In short, the denial of the principle of causality is the denial of scientific laws as well as the negation of reasoning. Science has to accept the principle of causality with all its inseparable corrolaries, in order that its existence could be meaningful.

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